DRAFT ENVIRONMENTAL ASSESSMENT FOR THE LONG TERM CONTRACT RENEWAL SHASTA AND TRINITY DIVISIONS

Prepared for:

U. S. Bureau of Reclamation
Mid-Pacific Region
2800 Cottage Way
Sacramento, California

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CHAPTER 1

PURPOSE AND NEED

1.1 INTRODUCTION

This Environmental Assessment (EA) was prepared by the U.S. Bureau of Reclamation (Reclamation) to evaluate the impacts and benefits of long-term renewal of water service and repayment contracts with the nine CVP water service contractors that comprise the Shasta and Trinity Divisions. The nine water service contractors (Contractors) are: Bella Vista Water District (BVWD), Clear Creek Community Services District (CCCSD), City of Redding-Buckeye, City of Shasta Lake, Shasta Community Services District (SCSD), Shasta County Water Agency (SCWA), Keswick County Service Area (KCSA), Mountain Gate Community Services District, and the U.S. Forest Service. Depending upon the Contractor, Reclamation and the Contractors propose to renew the water service contracts for agricultural and/or municipal and industrial (M&I) uses. Table 1-1 lists the existing long-term renewal water service contractors, and summarizes general water contractor information.

1.2 PURPOSE AND NEED FOR THE FEDERAL ACTION

The Reclamation Projects Authorization and Adjustment Act of 1992 (Public Law 102-575), included Title XXXIV, the Central Valley Project Improvement Act (CVPIA). The CVPIA amended the previous authorizations of the Central Valley Project (CVP) to include fish and wildlife protection, restoration, and mitigation as project purposes having equal priority with irrigation and domestic uses, and fish and wildlife enhancement as a project purpose equal to power generation. Section 3404(c) of the CVPIA directs the Secretary of the Interior (Secretary) to renew existing CVP water service and repayment contracts following completion of a Programmatic Environmental Impact Statement (PEIS) and other needed environmental documents by stating that:

> "…the Secretary shall, upon request, renew any existing long-term repayment or water service contract for the delivery of water for a period of 25 years and may renew such contracts for successive periods of up to 25 years each … (after) appropriate environmental review, including preparation of the environmental impact statement [the PEIS]…."

Section 3409 of the CVPIA required the Secretary to prepare a PEIS to evaluate the direct and indirect impacts and benefits of implementing CVPIA. The resulting PEIS was prepared under the National Environmental Policy Act (NEPA) by Reclamation and the U.S. Fish and Wildlife Service (USFWS), which became the co-lead agency in August 1999. Reclamation released a Draft PEIS on November 7, 1997. An extended comment period closed on April 17, 1998.

TABLE 1-1
SUMMARY OF EXISTING LONG-TERM WATER SERVICE CONTRACTORS
IN THE SHASTA AND TRINITY DIVISIONS

Contractor Name	Shasta or Trinity Division	Contract Number	Maximum Water Quantity of CVP Long-Term Contract Water (Acre-Feet)	% of Division Total Water Quantity	CVP M&I Rate Assigned[2]	CVP Agricultural Rate Assigned[2]	Post-CVPIA Expiration[3]
Bella Vista Water District	Trinity	851AIR3	**24,000**	44%	X	X	02/28/2001
City of Redding (Buckeye)	Shasta	5272A	**6,140**	11%	X	0	12/31/2009
Spring Creek Conduit	Shasta	5272A	Included		–	--	
Sacramento River	Shasta	5272A	Included		–	--	
Toyon Pipeline	Shasta	5272A	Included		–	--–	
City of Shasta Lake	Shasta	W11341R4	**2,750**	5%	X	0	2/28/2001
Shasta Dam Area P.U.D.		nav	Included		–	–	
Summit City P.U.D.		nav	Included		–	–	
Clear Creek Community Services District	Trinity	489A1R3	**15,300**	28%	X	X	2/28/2001
Shasta Community Services District	Trinity	862A	**1,000**	2%	X	0	12/31/2000
Shasta County Water Agency	Shasta	3367A	**5,000**[1]	9%	X	X[1]	12/31/2004
Others			**860**	2%	X	0	12/31/2009
Keswick County Service Area	Trinity	1307A	500	0.91%	X	0	12/31/2003
Mountain Gate Community Services District	Shasta	6998	350	0.64%	X	0	12/31/2003
U.S.F.S. (Centimundi Boat Ramp)	Shasta	3464A	10	0.02%	X	0	Indefinite
Total			**55,060**	**100%**			

Notes

[1] WA principally subcontracts water to others; agricultural water not used since 1983.
[2] x = yes, rate assigned
0 = no, rate not assigned
[3] Only Bella Vista, Clear Creek CSD, and City of Shasta Lake have interim agreements. Other contractors signed binding agreements for early renewal.

nav = information not available

Reclamation and the USFWS released the Final PEIS in October 1999. The Final PEIS included a Preferred Alternative that addressed the regional impacts and benefits of the general method that Reclamation anticipated of CVPIA, including long-term contract renewal, as described in Chapter 2 of this document.

The Record of Decision (ROD) for the PEIS includes the renewal of long-term CVP water contracts at the programmatic level. However, before individual long-term water contracts can be renewed, site-specific environmental documents that tier off of the CVPIA PEIS must be prepared. The purpose of this document is to evaluate the potential localized impacts that may result from the proposed contract renewal(s), and accordingly, provide the basis for a decision on how best to implement the CVPIA-specific objectives of renewed contracts at the individual or multi-district level.

The purpose of the proposed action is to renew Shasta and Trinity Divisions water service contracts consistent with the provisions of CVPIA. The project alternatives include the terms and conditions of the contracts and tiered water pricing.

Long-term contract renewal (LTCR) is needed to:

- Allow continued beneficial use of the water, developed and managed as part of the CVP, with a reasonable balance among competing demands, including the needs of agricultural and municipal and industrial users with the needs of fish, wildlife, recreation, and other water uses consistent with the requirements imposed by the State Water Resources Control Board (SWRCB) and CVPIA.

- Incorporate certain administrative conditions into the renewed contract to ensure continued compliance with current federal reclamation law and other applicable statutes.

- Allow the continued reimbursement to the Federal government for costs related to the construction and operation of the CVP.

1.3 BASIS OF CENTRAL VALLEY PROJECT WATER SERVICE CONTRACT RENEWALS

Reclamation is responsible for operational control of the CVP including securing payment for capital, and operations and maintenance (O&M). These costs are established in the water service contract with the Federal government. In addition, as a duly authorized representative, Reclamation administers all actions pertaining to the establishment of water service contracts on behalf of the Secretary of the Interior.

- Public Law 88-44, Reclamation Project Act of 1939, provided for repayment of construction charges and authorized sale of CVP water to municipalities and other public corporations and agencies. This act required the Secretary to comply with laws of the State relating to the control, appropriation, use, or distribution of water used in irrigation or vested rights acquired thereunder.

  Under PL 88-44 the Secretary was required to provide renewal, upon request of the other party, to any long-term contract for municipal, domestic, or industrial water supply. The contract renewal would be subject to renegotiation of: (1) the charges set forth in the contract in the light of circumstances prevailing at the time of renewal; and (2) any other matters with respect to which the right to renegotiate is reserved in the contract. PL 88-44 also stated that the Secretary shall, upon

request, provide in any such long-term contract that the other party to the contract shall, during the term of the contract and of any renewal (subject to fulfillment of other obligations), have a first right to a stated share or quantity of the CVP water supply available for municipal, domestic, industrial, or irrigation use.

- The Water Service Contracts Act of 1944 provided for delivery of specific quantities of irrigation and municipal and industrial water to contractors. The Reclamation Project Act of 1956 provided the right of renewal of long-term repayment or water service contracts for agricultural contractors for a term not to exceed 40 years. The Reclamation Project Act of 1963 provided the right of renewal of long-term repayment or water service contracts for municipal and industrial contractors.

- The CVPIA included a right of renewal of long-term repayment or water service contracts for a term not to exceed 25 years but the Secretary may or may not renew such contracts for successive periods for terms not exceed 25 years.

1.4 BASIS OF SHASTA AND TRINITY DIVISIONS WATER SERVICE CONTRACT RENEWALS

The Central Valley Project Authorization Act of 1937 authorized construction of the initial CVP project features for navigation, flood-control, water storage, construction of distribution systems, and hydropower generation. The River and Harbors Act of 1940 further authorized construction of CVP facilities and mandated that dams and reservoirs be used first for river regulation, improvement of navigation, and flood control; second for irrigation and domestic users; and third for power. This authorization was amended by the American River Division Authorization Act of 1949, Trinity River Act of 1955, San Luis Authorization Act of 1960, River and Harbors Act of 1962, and Auburn-Folsom South Unit Authorization Act of 1967. The Shasta Division was authorized under the original CVP contract dated August 26, 1937, the Trinity River Division was authorized separately under the Trinity Division, CVP-Act of August 12, 1955.

Key provisions of the existing water contracts are summarized in Table 1-1, Summary of Existing Water Contracts - Shasta and Trinity Divisions. Presently the Bella Vista Water District, Clear Creek Community Services District and the City of Shasta Lake are receiving water under the interim agreement which expires on February 28, 2001. The remainder of the contractors signed binding agreements for early renewal.

The **Bella Vista Water District (BVWD)** is a publicly owned water agency formed in 1957 under California Water Code Division 13, Sections 34000 through 38501. BVWD entered into a contract with the Federal government on April 4, 1964, for the delivery of up to 24,000 acre-feet (total) of CVP water annually for agricultural and M&I uses.

The **City of Redding** is the largest city in Shasta County with a population of 78,490 (1995). Prior to 1941, water service within the City of Redding was provided by the California Water Service Company, whose water rights dated from 1886. The City of Redding acquired the local facilities and water rights of the company in 1941, and filed for additional appropriative water rights of 5 cubic feet per second (cfs) in 1944. Subsequent annexations to the City's service area included the Buckeye County Water District (1967), the Cascade Community Services District (1976), and the Enterprise Public Utility District (1977).

The City entered into a contract with the Federal government on February 22, 1994, for the delivery of up to 6,140 acre-feet of CVP water annually for M&I uses in the **Buckeye Zone**. This agreement is separate and distinct from a 1966 Settlement Contract with Reclamation, under which the City obtains additional water.

The **City of Shasta Lake** was incorporated in July of 1993, and receives 2,750 acre-feet of water under interim contract number 1134, formalized on March 3, 1994. Prior to incorporation, water was supplied to the area by the Shasta Dam Area Public Utilities District (SDAPUD) and the Summit City Public Utilities District (SCPUD).

The SDAPUD was formed in 1945 to supply water to workers constructing Shasta Dam. The original 276 acre-feet contract with the Federal government was entered into August 12, 1948. On September 15, 1955, the contract was amended to 375 acre-feet. In July of 1957, the contract was further amended to 3,225 acre-feet.

The original SCPUD contract with the Federal government was initiated on October 22, 1948 for 60 acre-feet. The contract was amended in July of 1966 (amount unknown) and again on December 9, 1975 to 1,170 acre-feet.

In 1978, the SDAPUD and SCPUD contracts were merged into one long-term contract. In 1988, when the earlier contracts expired, it was assumed that the long-term contract amount would be 4,400 acre-feet (the total of the two individual contracts). At the time, however, there was no right to renewal available, and the contract amount agreed upon was 2,750 acre-feet.

On September 15, 1993, the City of Shasta Lake assumed the merged contract. The contract subsequently expired and the city entered into the March 1994 interim contract.

The **Clear Creek Community Services District (CCCSD)** is a publicly owned water agency formed in 1961 under Trinity River Division Act of 1955. CCCSD entered into a contract with the Federal government on May 14, 1963, for the delivery of up to 15,300 acre-feet (total) of CVP water annually for agricultural and M&I uses.

The **Shasta Community Services District (SCSD)** was formed in June 1959, under the Community Services District Laws, Sections 61000 through 61934 of the Governmental Code of the State of California. The SCSD entered into a contract with the Federal government on March 25, 1964, for the delivery of up to 1,000 acre-feet of CVP water annually for M&I use.

The **Shasta County Water Agency (SCWA)** was formed in 1957 through Legislative Act 7580, Shasta County Water Agency Act. On June 30, 1967, the SCWA entered into a contract with the Federal government for the delivery of up to 5,000 acre-feet of CVP water annually (total) for agricultural and M&I uses. SCWA supplies water to the Centerville Community Services District (2,900 acre-feet), Mountain Gate CSD (1000 acre-feet), Bella Vista WD (578.7 acre-feet), Jones Valley CSA #6 (190 acre-feet), Crag View CSA #23 (119 acre-feet), Castella CSA #3 (77 acre-feet), and numerous smaller areas such as the Silverthorn development, French Gulch School, and Shasta Holiday MWC.

The **Keswick County Service Area (KCSA)** was preceded by the Keswick Community Services District, which was formed in the early 1960s under the Community Services District Laws, Sections 61000 through 61934 of the Governmental Code of the State of California. In October 1990 the Keswick Community Services District was dissolved and reorganized as the KCSA under Sections 25210.1 through 25250 of the Governmental Code of the State of California. The KCSA, through its predecessor agency, entered into a contract with the Federal government on September 16, 1964. for delivery of up to 500 acre-feet of CVP water annually for M&I use.

The **Mountain Gate Community Services District (MGCSD)** was formed in 1956 pursuant to Government Code, Title 6, Division 3, Sections 61000 through 61800. The MGCSD entered into a contract with the Federal government on March 12, 1958, for the delivery of up to 350 acre-feet of CVP water annually for M&I use.

The **U.S. Forest Service (USFS)** entered into a contract with Reclamation on November 2, 1967, for delivery of up to 10 acre-feet of CVP water for M&I uses at the Centimudi boat ramp on Shasta Lake.

1.5 RELATION TO THE CENTRAL VALLEY PROJECT IMPROVEMENT ACT PROGRAMMATIC ENVIRONMENTAL STATEMENT (CVPIA PEIS)

The PEIS provided a programmatic evaluation of the impacts of implementing the CVPIA. Four alternatives, 17 supplemental analyses, Preferred Alternative, and No Action Alternative were evaluated in the PEIS. The impact analysis in the PEIS was completed at a subregional level but presented within the PEIS on a regional basis for the Sacramento Valley, San Joaquin Valley, and Tulare Lake regions. The PEIS No Action Alternative assumed that existing water service contracts would be renewed under the same terms as expiring contracts. The Final PEIS included a Preferred Alternative that addressed the regional impacts and benefits of the general method that Reclamation anticipated with implementation of CVPIA, including long-term contract renewal, as described in Chapter 3 of this document.

Following completion of the PEIS, Reclamation prepared additional environmental documentation for renewal of long-term water service and repayment contracts, including this EA to address the site-specific impacts relating to contract renewals within the Shasta and Trinity Divisions.

1.6 STUDY AREA

The general location of the Shasta and Trinity Divisions is shown in Figure 1-1, Shasta and Trinity Divisions Regional Map. The Study Area for this EA is defined by the service area boundaries of the nine Contractors. The service area boundaries and names of the nine Contractors within the Shasta and Trinity Divisions are shown in Figure 1-2. The Study Area encompasses about 118,135 acres (185 square miles).

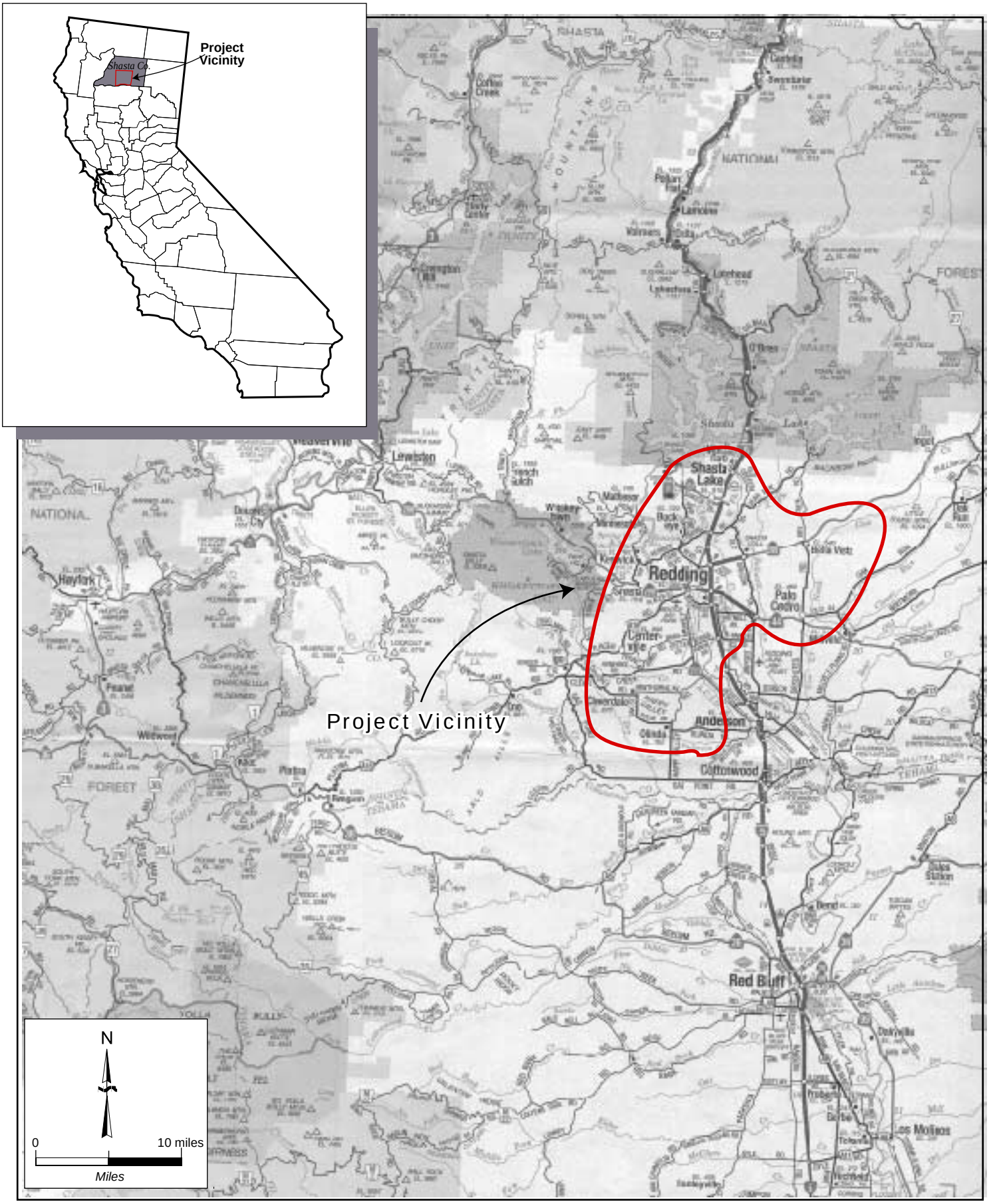
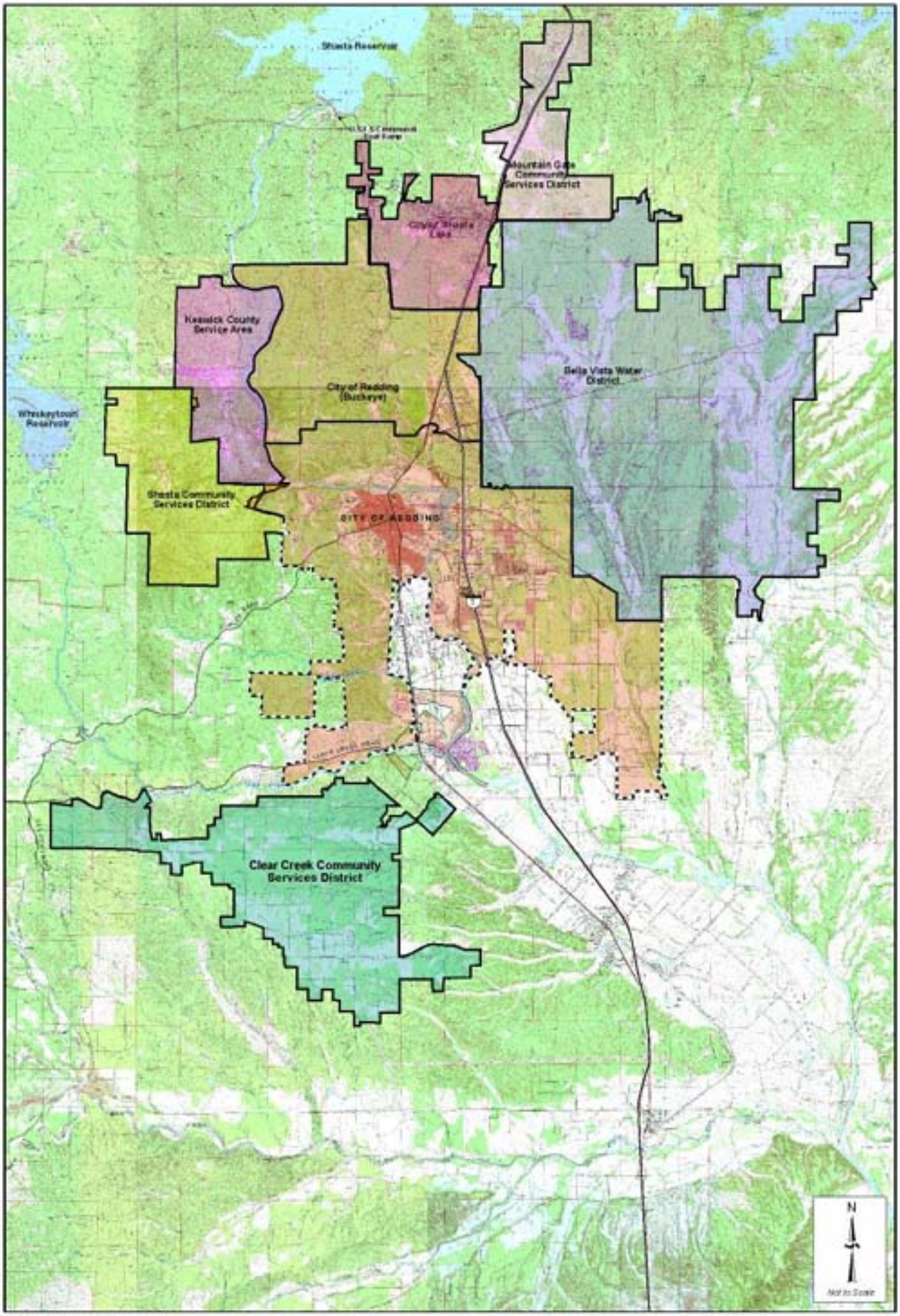


Figure 1-1
Regional Location



Source: CH2M HILL and North State Resources, Inc.

Figure 1-2
Map of District Service Areas Within The Shasta and Trinity Divisions Long-Term Contract Renewal
Draft Environmental Assessment

1.7 STUDY PERIOD

The analysis for this EA was conducted for projected conditions in the Year 2026 which will extend through the first period of renewal for the 25-year long-term water service contracts. No interim time period conditions were considered or evaluated with respect to build-out conditions or changes in the CVP contract.

1.8 PUBLIC INVOLVEMENT PROCESS

Reclamation started the preparation of this EA during the Scoping phase for the CVP PEIS. Scoping served as a fact-finding process that helped identify public concerns and recommendations about the NEPA process, issues that would be addressed in this EA, and the scope and level of detail for analyses. Specific scoping activities began in October 1998 after a Notice of Intent to prepare the environmental documents on long-term contract renewal of CVP repayment and water service contracts.

The long-term contract renewal process was conducted as a public process. Throughout the contract renewal process, meetings were held with the contractors, other agencies, interest groups, and the public (see Chapter 6). Issues raised during the public involvement process were addressed in the negotiations process and were used in the preparation of this EA.

1.9 RELATED ACTIVITIES

There are several activities being implemented by Reclamation as part of the obligation to manage and operate the CVP. The following table identifies these activities and describes their relation to the renewal of the Shasta and Trinity Divisions' water service contracts. Related studies and projects that have been conducted recently or are currently being completed are summarized in Table 1-2.

TABLE 1-2
RELATED ACTIVITIES

Project or Study and Lead Agency	Summary
Long-Term Contract Renewal of Other Existing CVP Water Service Contracts - Reclamation	Reclamation is in negotiation with other CVP water contractors outside the Shasta and Trinity Divisions for renewal of long-term contracts, including contractors
CALFED Bay-Delta Program - CALFED	Established in May 1995, the consortium of Federal and state agencies is charged with the development of a long-term solution to the Delta water concerns. CALFED completed an EIR/EIS (July 2000) as part of this process. Renewal of Long-Term CVP Contracts is assumed within the CALFED EIR/EIS.
Coordinated Operating Agreement (COA) and Operations Criteria and Plan (OCAP) Update - U.S. Bureau of Reclamation and California Department of Water Resources	Provisions and requirements of the CVPIA, SWRCB Order 1641, the CALFED Bay-Delta Program, and other agency mandates require that the existing operational roles and responsibilities of the SWP and CVP be reviewed and updated to provide appropriate long-term operating criteria and procedures for the two primary water storage and delivery projects affecting waterways of the Central Valley.

CHAPTER 2

DESCRIPTIONS OF ALTERNATIVES

2.1 INTRODUCTION

This chapter summarizes the long-term water service contract negotiations process and descriptions of the alternatives considered in this Environmental Assessment (EA).

2.2 LONG-TERM WATER SERVICE CONTRACT NEGOTIATIONS PROCESS

The Central Valley Project Improvement Act (CVPIA) states that the Secretary shall, upon request, renew any existing long-term irrigation repayment or water service contract for the delivery of Central Valley Project (CVP) water for a period of 25 years and may renew such contracts for successive periods of up to 25 years each. Consistent with the 1963 Act, M&I contracts shall be renewed for successive periods up to 40 years each under terms and conditions that are mutually agreeable. The CVPIA also states that no renewals shall be authorized until appropriate environmental review, including the Programmatic Environmental Impact Statement (PEIS), has been completed. The PEIS provided a programmatic environmental analysis and identified the need for site-specific environmental documents for the long-term contract renewal process.

The CVPIA also stated that contracts which expire prior to the completion of the PEIS may be renewed for interim periods. The interim renewal contracts reflect existing Reclamation law, including modifications due to Reclamation Reform Act and applicable CVPIA requirements. The initial interim contract renewals were negotiated in 1994 with subsequent renewals for periods of two years or less to provide for continued water service. Many of the provisions from the interim contracts were assumed to be part of the contract renewal provisions in the description of the PEIS Preferred Alternative.

In 1998, the long-term contract renewal process was initiated. Reclamation reviewed the interim contract provisions that were consistent with Reclamation law and other requirements, comments from the Draft PEIS, and comments obtained during the interim contract renewal process. Reclamation proposed that the overall provisions of the long-term contract would be negotiated with representatives of all CVP water service contractors. Following the acceptance of the CVP-wide provisions, Reclamation proposed that division-specific provisions and, finally, contractor-specific provisions would be negotiated. Reclamation also proposed that all water service contracts except for Central San Joaquin Irrigation District, Stockton East Water District, and Colusa Drain Mutual Water Company would be renewed pursuant to this action. Contract renewals for these three districts would be delayed until the completion of a water management studies for their primary sources of CVP water, the Stanislaus River and the Sacramento River.

Reclamation published the initial proposed contract in November 1999. There were several negotiations sessions throughout the next six months. The CVP water service contractors published a counter-proposal in April 2000. The November 1999 proposal represents one "bookend" for negotiations and the April 2000 proposal represents the other "bookend." The results of the negotiations are reflected in the subsequent proposals. The primary differences between the proposals are summarized in Table 2-1.

2.3 ISSUES CONSIDERED AS PART OF LONG-TERM CONTRACT RENEWALS

The long-term contract renewal process addressed several other issues in addition to the contract provisions. These issues include the needs analyses, changes in service areas, and water transfers.

2.3.1 NEEDS ANALYSIS

The water rights granted to the CVP by the State Water Resources Control Board (SWRCB) requires the Federal government to determine that the water is being used in a beneficial manner. The needs analysis methodology was developed to indicate that the CVP water is being used beneficially. The needs analysis was computed for each District within the various divisions or units of the CVP using a multiple-step approach. First, the existing water demand was calculated for each district. For agricultural contractors, crop acreage, cropping patterns, crop water needs, effective precipitation, and conveyance losses were reviewed. For municipal and industrial contractors, residential, commercial, industrial, institutional, recreational, and environmental uses; landscape coefficients; system losses; and landscape acreage were reviewed. Second, future changes in water demands based upon crops, municipal and industrial expansion, and changes in efficiencies were reviewed. Third, existing and future non-CVP water supplies were identified for each district, including groundwater and other surface water supplies. The initial calculation of CVP water needs was limited by the assumption that groundwater pumping would not exceed the safe yield of the aquifer. In addition, the actual water needs were calculated at each division or unit level to allow for intra-regional transfers on an annual basis.

Beneficial and efficient future water demands were identified for each district. The demands were compared to available non-CVP water supplies to determine the need for CVP water. If the need was less than contract amounts, the CVP water service contract amount could be reduced. Because the CVP was initially established as a supplemental water supply for areas without adequate supplies, the needs for most districts are at least equal to the CVP water service contract and frequently exceeded the previous contract amount. However, this environmental analysis does not include increased total contract amounts. Therefore, the CVP contract amount will be limited by the existing CVP contract quantity.

2.3.2 CHANGES IN WATER SERVICE AREAS

This environmental analysis does not consider future changes in water service area boundaries for use of CVP water. Any future changes to water service area boundaries for use of CVP water will be evaluated in separate technical and environmental analyses.

TABLE 2-1
COMPARISON OF CONTRACT PROVISIONS CONSIDERED IN ALTERNATIVES

	No Action Alternative	Alternative 1	Alternative 2
Provision	**Based on PEIS and Interim Contracts**	**Based on April 2000 Proposal**	**Based on November 1999 Proposal**
Explanatory Recitals	Assumes water rights held by CVP from SWRCB for use by water service contractors under CVP policies	Assumes CVP Water Right as being held in trust for project beneficiaries that may become the owners of the perpetual right.	Same as No Action Alternative
	Assumes that CVP is a significant part of the urban and agricultural water supply of users	Assumes CVP as a significant, essential, and irreplaceable part of the urban and agricultural water supply of users	Same as No Action Alternative
	Assumes increased use of water rights, need to meet water quality standards and fish protection measures, and other measures constrained use of CVP	Assumes that CVPIA impaired ability of CVP to deliver water	Same as No Action Alternative
	Assumes the need for the 3408(j) study	Assumes implementation of yield increase projects per 3408(j) study	Same as No Action Alternative
	Assumes that loss of water supply reliability would have impact on socioeconomic conditions and change land use	Assumes that loss of water supply reliability would have significant adverse socioeconomic and environmental impacts in CVP service area	Same as No Action Alternative
Definitions			
"Charges"	Charges defined as payments required in addition to Rates	Assumes rewording of definition of Charges to exclude both Rates and Tiered Pricing Increments	Same as No Action Alternative
"Category 1 and Category 2"	Tiered Pricing as in PEIS	Not included	Tiered Pricing for Categories 1 and 2

TABLE 2-1
COMPARISON OF CONTRACT PROVISIONS CONSIDERED IN ALTERNATIVES

	No Action Alternative	Alternative 1	Alternative 2
Provision	**Based on PEIS and Interim Contracts**	**Based on April 2000 Proposal**	**Based on November 1999 Proposal**
"Contract Total"	Contract Total described as Total Contract	Same as No Action Alternative	Described as basis for Category 1 to calculate Tiered Pricing
"Landholder"	Landholder described in existing Reclamation Law	Assumes rewording to specifically define Landholder with respect to ownership, leases, and operations	Assumes rewording to specifically define Landholder with respect to ownership and leases
"M&I Water"	Assumes rewording to provide water for irrigation of land in units less than or equal to 5 acres as M&I water unless Contracting Officer satisfied use is irrigation	M&I water described for irrigation of land in units less than or equal to 2 acres	Same as No Action Alternative
Terms of Contract - Right to Use Contract	Assumes that contracts may be renewed	States that contract shall be renewed	Same as No Action Alternative
	Assumes convertibility of contract to a 9(d) contract same as existing contracts	Includes conditions that are related to negotiations of the terms and costs associated with conversion to a 9(d) contract	Same as No Action Alternative
Water to be Made Available and Delivered to the Contractor	Assumes water availability in any existing conditions	Similar to No-Action Alternative	Actual water availability in year is unaffected by Categories 1 and 2.
	Assumes compliance with Biological Opinions and other environmental documents for contracting	Not included	Same as No Action Alternative
	Assumes that current operating policies strives to minimize impacts to CVP water users	Assumes that CVP operations will be conducted in a manner to minimize shortages and studies to increase yield shall be completed with necessary authorizations	Same as No Action Alternative

TABLE 2-1
COMPARISON OF CONTRACT PROVISIONS CONSIDERED IN ALTERNATIVES

	No Action Alternative	Alternative 1	Alternative 2
Provision	**Based on PEIS and Interim Contracts**	**Based on April 2000 Proposal**	**Based on November 1999 Proposal**
Time for Delivery of Water	Assumes methods for determining timing of deliveries as in existing contracts	Assumes minor changes related to timing of submittal of schedule	Same as No Action Alternative
Point of Diversion and Responsibility for Distribution of Water	Assumes methods for determining point of diversion as in existing contracts	Assumes minor changes related to reporting	Same as No Action Alternative
Measurement of Water Within District	Assumes measurement for each turnout or connection for facilities that are used to deliver CVP water as well as other water supplies	Assumes measurement at delivery points	Assumes similar actions in No Action Alternative but applies to all water supplies
Rates and Method of Payment for Water	Assumes Tiered Pricing is total water quantity. Assumes advanced payment for rates for 2 months.	Assumes Tiered Pricing is total water quantity. Assumes advanced payment for rates for 1 month.	Assumes Tiered Pricing is total water quantity. Assumes advanced payment for rates for 6 months.
Non-interest Bearing Operation and Maintenance Deficits	Assumes language from existing contracts	Same as No Action Alternative	Same as No Action Alternative
Sales, Transfers, or Exchanges of Water	Assumes continuation of transfers with the rate for transferred water being the higher of the sellers or purchasers CVP cost of service rate	Assumes continuation of transfers with the rate for transferred water being the purchasers CVP cost of service rate	Same as No Action Alternative
Application of Payments and Adjustments	Assumes payments will be applied as in existing contracts	Assumes minor changes associated with methods described for overpayment	Same as No Action Alternative
Temporary Reduction - Return Flows	Assumes that current operating policies strives to minimize impacts to CVP water users	Assumes minor changes associated with methods described for discontinuance or reduction of payment obligations	Same as No Action Alternative

TABLE 2-1
COMPARISON OF CONTRACT PROVISIONS CONSIDERED IN ALTERNATIVES

	No Action Alternative	Alternative 1	Alternative 2
Provision	**Based on PEIS and Interim Contracts**	**Based on April 2000 Proposal**	**Based on November 1999 Proposal**
Constraints on Availability of Project Water	Assumes that current operating policies strives to minimize impacts to CVP water users	Assumes Contractors do not consent to future Congressional enactments which may impact water supply reliability	Same as No Action Alternative
Unavoidable Groundwater Percolation	Assumes that some of applied CVP water will percolate to groundwater	Same as No Action Alternative	Same as No Action Alternative
Rules and Regulations	Assumes that CVP will operate in accordance with then existing rules	Assumes minor changes with right to non-concur with future enactments retained by Contractors	Same as No Action Alternative
Water and Air Pollution Control	Assumes that CVP will operate in accordance with then existing rules	Same as No Action Alternative	Same as No Action Alternative
Quality of Water	Assumes that CVP will operate in accordance with existing rules without obligation to operate towards water quality goals	Same as No Action Alternative	Same as No Action Alternative
Water Acquired by the Contractor Other than from the United States	Assumes that CVP will operated in accordance with existing rules	Assumes changes associated with payment following repayment of funds	Same as No Action Alternative
Opinions and Determinations	PEIS recognizes that CVP will operated in accordance with existing rules	Assumes minor changes with respect to references to the right to seek relief	Same as No Action Alternative
Coordination and Cooperation	Not included	Assumes that coordination and cooperation between CVP operations and users should be implemented and CVP users should participate in CVP operational decisions	Not included
Charges for Delinquent Payments	Assumes that CVP will operate in accordance with existing rules	Same as No Action Alternative	Same as No Action Alternative

TABLE 2-1
COMPARISON OF CONTRACT PROVISIONS CONSIDERED IN ALTERNATIVES

	No Action Alternative	Alternative 1	Alternative 2
Provision	**Based on PEIS and Interim Contracts**	**Based on April 2000 Proposal**	**Based on November 1999 Proposal**
Equal Opportunity	Assumes that CVP will operate in accordance with existing rules	Same as No Action Alternative	Same as No Action Alternative
General Obligation	Assumes that CVP will operate in accordance with existing rules	Similar to No Action Alternative	Same as No Action Alternative
Compliance with Civil Rights Laws and Regulations	Assumes that CVP will operate in accordance with existing rules	Same as No Action Alternative	Same as No Action Alternative
Privacy Act Compliance	Assumes that CVP will operate in accordance with existing rules	Same as No Action Alternative	Same as No Action Alternative
Contractor to Pay Certain Miscellaneous Costs	Assumes that CVP will operate in accordance with existing rules	Similar to No Action Alternative	Same as No Action Alternative
Water Conservation	Assumes compliance with conservation programs established by Reclamation and the State	Assumes conditions similar to No Action Alternative with the ability to use State standards which may or may not be identical to Reclamation's requirements	Same as No Action Alternative
Existing or Acquired Water or Water Rights	Assumes that CVP will operated in accordance with existing rules	Same as No Action Alternative	Same as No Action Alternative
Operation and Maintenance by Non-federal Entity	Assumes that CVP will operate in accordance with existing rules and no additional changes to operation responsibilities under this alternative	Assumes minor changes to language that would allow subsequent modification of operational responsibilities	Assumes minor changes to language that would allow subsequent modification of operational responsibilities
Contingent on Appropriation or Allotment of Funds	Assumes that CVP will operate in accordance with existing rules	Assumes minor changes to language	Same as No Action Alternative
Books, Records, and Reports	Assumes s that CVP will operate in accordance with existing rules	Assumes changes for record keeping for both CVP operations and CVP users	Same as No Action Alternative

TABLE 2-1
COMPARISON OF CONTRACT PROVISIONS CONSIDERED IN ALTERNATIVES

	No Action Alternative	Alternative 1	Alternative 2
Provision	**Based on PEIS and Interim Contracts**	**Based on April 2000 Proposal**	**Based on November 1999 Proposal**
Assignment Limited	Assumes that CVP will operate in accordance with existing rules	Assumes changes to facilitate assignments	Same as No Action Alternative
Severability	Assumes that CVP will operate in accordance with existing rules	Same as No Action Alternative	Same as No Action Alternative
Resolution of Disputes	Not included	Assumes a Dispute Resolution Process	Not included
Officials Not to Benefit	Assumes that CVP will operate in accordance with existing rules	Same as No Action Alternative	Same as No Action Alternative
Changes in Contractor's Service Area	Assumes no change in CVP water service areas absent Contracting Officer consent	Assumes changes to limit rationale used for non-consent and sets time limit for assumed consent	Same as No Action Alternative
Notices	Assumes that CVP will operate in accordance with existing rules	Same as No Action Alternative	Same as No Action Alternative
Confirmation of Contract	Assumes Court confirmation of contract	Not included - Assumption is Court confirmation not required	Same as No Action Alternative

2.3.3 WATER TRANSFERS

Several different types of transfers are considered for long-term contract renewals. Intra-CVP contract transfers have occurred regularly throughout the CVP and are frequently limited to scheduling changes between adjoining districts. Reclamation has historically issued and will continue to address these types of transfers under separate environmental analysis.

It is recognized that water transfers will continue to occur and that the CVP long-term contracts will provide the mechanism. Because CVPIA has allowed these transfers, as evaluated in the PEIS for the Preferred Alternative, the No Action Alternative includes water transfer provisions. These provisions for transfers are also included in both Alternatives 1 and 2. However, it is difficult to identify all of the water transfer programs that could occur with CVP water in the next 25 years. Reclamation would continue with separate environmental documents for proposed transfers in establishing criteria and protocols to allow rapid technical and environmental review of future proposed transfers.

2.4 DEVELOPMENT OF ALTERNATIVES

Three alternatives were identified for the renewal of long-term contracts between Reclamation and contractors in the Shasta and Trinity Divisions.

The alternatives present a range of water service agreement provisions that could be implemented for long-term contract renewals. The No Action Alternative consists of renewing existing water service contracts as described by the Preferred Alternative of the PEIS. In November 1999, Reclamation published a proposed long-term water service contract. In April 2000, the CVP Contractors presented an alternative long-term water service contract. Reclamation and the CVP Contractors continued to negotiate the CVP-wide terms and conditions with these proposals serving as "bookends." This EA also considers these proposals with the No Action Alternative as bookends to be considered for the environmental documentation to evaluate the impacts and benefits of the renewing long-term water service contracts. Chapter 4 describes environmental consequences in terms of incremental effects that would accrue due to implementing Alternative 1 or Alternative 2 as compared to the No- Action Alternative.

2.4.1 NO ACTION ALTERNATIVE

The No Action Alternative assumes renewal of long-term CVP water service contracts for a period of 25 years in accordance with implementation of CVPIA as described in the PEIS Preferred Alternative. The PEIS Preferred Action assumed that most contract provisions would be similar to many of the provisions in the 1997 CVP Interim Renewal Contracts, which included contract terms and conditions consistent with applicable CVPIA requirements. In addition, the No Action Alternative assumes tiered pricing provisions and environmental commitments as described in the PEIS Preferred Alternative. The provisions of the No Action Alternative are summarized in Table 2-1. These provisions were described in the Final PEIS.

Several applicable CVPIA provisions are summarized in the description of the No Action Alternative in the description of the No Action Alternative as they are addressed in a different manner in Alternatives 1 and/or 2 and, therefore, could result in changes in environmental impacts or benefits. These issues include tiered water pricing, definition of municipal and industrial water users, water measurement, and water conservation.

Tiered Water Pricing

Tiered water pricing in the No Action Alterative is based upon use of a "80/10/10 Tiered Water Pricing from Contract Rate to Full Cost" including appropriate Ability-to-Pay limitations. Under this approach, the first 80 percent of the maximum contract total would be priced at the applicable Contract Rate. The next 10 percent of the contract total would be priced at a rate equal to the average of the Contract Rate and Full Cost Rate. The final 10 percent of the contract total would be priced at Full Cost Rate. The terms "Contract Rate" and "Full Cost Rate" are defined by the CVP rate setting policies, and P.L. 99-546 and the Reclamation Reform Act (RRA), respectively. The Contract Rate for irrigation and municipal and industrial (M&I) water includes the contractor's allocated share of CVP main project operations and maintenance (O&M), O&M deficit, if any, and capital cost. The Contract Rate for irrigation water does not include interest on capital. The Contract Rate for M&I water includes interest on capital computed at the CVP M&I interest rate. The Full Cost rate for irrigation and M&I water includes interest at the RRA interest rate.

In addition to the CVP water rate, contractors are required to pay a Restoration payment on all deliveries on CVP water. Reclamation law and policy provides full or partial relief to irrigation contractors on Restoration Payments and the capital rate component of the water rate. Ability-to-pay relief, relative to the irrigation water rate, is fully applicable only to the first 8 percent of the contract total. Ability-to-pay relief is not applicable to the third tier water rate. The second tier may reflect partial. Ability-to-pay relief, as it is equal to the average of the first and third tiers. The relief could be up to 100 percent of the capital cost repayment and is based upon local farm budgets. The Ability-to-Pay law and policy do not apply to CVP operation and maintenance costs, municipal or industrial water rates, CVP distribution facilities, or non-CVP water costs.

The prices of CVP water used in the No Action Alternative are based upon 1994 irrigation and municipal/industrial CVP water rates.

Definition of Municipal and Industrial Users

The definition of municipal and industrial users was established in portions of a 1982 Reclamation policy memorandum. In many instances, the definition of municipal users is easily definable. However, with respect to small tracts of land, the 1982 memorandum identified agricultural water as agricultural water service to tracts that can support $5,000 gross income for a commercial farm operation. The memorandum indicates that this criteria can be generally met by parcels greater than 2 acres. Based on this analysis, the CVP has generally applied a definition of 5 acres or less for municipal and industrial uses in the CVP for many years. The CVP contractors can seek a modification for a demonstrated need of agricultural use on parcels between 2 and 5 acres and request such a modification from the Contracting Officer.

Water Measurement

The No Action Alternative includes water measurement at every turnout or connection to measure CVP water deliveries. It is assumed that if other sources are commingled with the CVP water, including groundwater or other surface waters, that the measurement devices would report gross water deliveries. Additional calculations would be required to determine the exact quantity of CVP water. However, if groundwater or other surface waters are delivered by other means to the users, the No Action Alternative did not include additional measurement devices except as required by individual users' water conservation plans.

Water Conservation

The water conservation assumptions in the No Action Alternative include water conservation actions for municipal and on-farm uses assumed in the Department of Water Resources (DWR) Bulletin 160-93; and conservation plans completed under the 1982 Reclamation Reform Act consistent with the criteria and requirements of the CVPIA. Such criteria address cost-effective Best Management Practices that are economical and appropriate, including measurement devices, pricing structures, demand management, public information; and financial incentives.

2.4.2 ALTERNATIVE 1

Alternative 1 is based upon the proposal presented by CVP water service contractors to Reclamation in April 2000. However, there were several issues included in the April 2000 proposal that could not be included in Alternative 1 because they are not consistent with existing Federal or state requirements or would require a separate Federal action, as described below.

- The April 2000 proposal includes Terms and Conditions to provide a highly reliable water supply, and provisions to improve the water supply capabilities of the CVP facilities and operations to meet this goal - *These issues were not included in Alternative 1 because these issues would require additional Federal actions with separate environmental documentation and also limit the Secretary's obligation to achieve a reasonable balance among competing demands as required by the CVPIA. Currently Reclamation is completing the least cost plan to restore project yield in accordance with Section 3408(j) of CVPIA and under the CALFED program.*

- The April 2000 proposal includes language to require renewal of contracts after 25 years upon request of the contractor - *The study period for this EA is 25 years which coincides with the contract period applicable to irrigation contracts and required by CVPIA. Renewal after 25 years would be a new Federal Action and would require new environmental documentation.*

- The April 2000 proposal did not include provisions for compliance with biological opinions - *Biological consultations are required by the Consultation and Coordination requirements established by Executive Order for all Reclamation activities. These are binding on Reclamation and provisions are needed to address this requirement.*

- The April 2000 proposal included provisions for water transfers - *It is recognized that water transfers will continue and that the CVP long-term contracts will provide the mechanisms for the*

transfers. However, it would be difficult to identify all of the water transfer programs that could occur with CVP water in the next 25 years. Reclamation would continue with separate environmental documents for transfers, and will establish criteria to for rapid technical and environmental review of proposed transfers.

- The April 2000 proposal includes provisions for transfer of operations and maintenance requirements - *It is recognized that transfers of operation and maintenance to the group of contractors will continue and that the CVP long-term contracts will provide the mechanisms for such transfers. However, it would be difficult to identify all of the operation and maintenance transfer programs that could occur with CVP water in the next 25 years. Reclamation would require separate environmental documents for such transfers.*

- The April 2000 proposal includes provisions for resolution of disputes - *Assumptions for resolution of disputes were not included in Alternative 1 and at this time would not appear to affect environmental conditions.*

- The April 2000 proposal includes provisions for expansion of the CVP service areas by the existing CVP water contractors - *The study area for the long-term contract renewal process is defined by the existing service area boundaries. Expansion of the service area boundaries would be a new Federal Action and would require separate environmental documentation.*

The April 2000 proposal did include several provisions that were different than the assumptions for No Action Alternative and those provisions are included in Alternative 1, as summarized in Table 2-1. The April 2000 proposal also included several provisions that involve specific language changes that would not significantly modify CVP operations in a manner that would affect the environment as compared to the No Action Alternative but could affect specific operations of a contractor, as described in Table 2-1.

It should be noted that the tiered pricing requirements (including unit prices for CVP water) and definition of municipal/industrial users in Alternative 1 would be the same as in the No Action Alternative.

2.4.3 ALTERNATIVE 2

Alternative 2 is based upon the proposal presented by Reclamation to CVP water service contractors in November 1999. However, there were several provisions included in the November 1999 proposal that are not be included in Alternative 2. These provisions would constitute a separate Federal action, as described below.

- The November 1999 proposal includes provisions for the contractor to request approval from Reclamation of proposed water transfers - *Water transfers were not included in Alternative 2 because such actions cannot now be definitely described and essentially constitute a separate Federal action and require separate environmental documentation.*

- The November 1999 proposal includes provisions for transfer of operations and maintenance third parties - *Operations and maintenance transfers were not included in Alternative 2 because these actions would be a separate Federal action and require separate environmental documentation.*

The November 1999 proposal did include several provisions that were different than the assumptions for No Action Alternative and included in Alternative 2, as summarized below and in Table 2-1. The primary differences are related to tiered pricing and the definition of municipal and industrial users.

Tiered Water Pricing

Tiered water pricing in Alternative 2 is based upon a definition of "Category 1" and "Category 2" water supplies. "Category 1" is defined as the quantity of CVP water that is reasonably likely to be available for delivery to a contractor and is calculated on an annual basis as the average quantity of delivered water during the most recent 5 year period. For the purposes of this Alternative, the "Category 1" water supply is defined as the "contract total." "Category 2" is defined as that additional quantity of CVP water in excess of Category 1 water that may be delivered to a contractor in some years. Under Alternative 2, the first 80 percent of Category 1 volume would be priced at the applicable Contract Rate for the CVP. The next 10 percent of the Category 1 volume would be priced at a rate equal to the average between the Contract Rate and Full Cost Rate as defined by Reclamation law and policy. The final 10 percent of the Category 1 volume would be priced at the Full Cost Rate as required by the CVPIA. All Category 2 water, when available, would be priced at Full Cost Rate. It should be noted that Category 1 and Category 2 volumes will change every year based upon the average deliveries for the "most recent 5 years," with limited exception, based upon the findings of the water needs assessment. Alternative 2 assumes the sum of Category 1 and Category 2 water is equal to the maximum quantity included in the contractors' existing water service contract. The quantity is the same as the No Action Alternative and Alternative 1. The terms "Contract Rate" and "Full Cost Rate" are discussed under Tiered Pricing for the No Action Alternative. The same Ability-to-Pay adjustments would be applicable to Restoration Payments and tiered water rates as described in the No Action Alternative.

The prices of CVP water used in Alternative 2 are based upon irrigation and municipal/industrial CVP water rates presented in the November 17, 1999 Financial Workshop Handouts 1 and 2.

Definition of Municipal and Industrial Users

The definition of municipal and industrial water includes all tracts less than or equal to 5 acres unless the Contracting Officer is satisfied that the use of such water meets the definition of "Irrigation Water."

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED

2.5.1 NONRENEWAL OF LONG-TERM CONTRACTS

Nonrenewal of existing contracts is considered infeasible based on Section 3404(c) of the CVPIA. This alternative was considered but eliminated from analysis in this EA because Reclamation has no discretion not to renew the contracts.

2.5.2 REDUCTION IN CONTRACT AMOUNTS

Reduction of contract amounts was considered in certain cases but rejected from analysis. The reason for this twofold. Water needs analyses have been completed for all contracts and in almost all cases the needs exceed or equal the current total contract amount. Secondly, in order to implement good water management, the contractors need to be able to store or immediately use water available in wetter years when more water is available. By quantifying contract amounts in terms of the needs analyses and the CVP delivery capability, the contractors can make their own economic decisions. Allowing the contractors to retain the full water quantity gives the contractors assurance that the water will be available to them for storage investments. In addition the CVPIA, in and of itself, achieves a balance in part through its dedication of significant amounts of CVP water, and actions to acquire water for environmental purposes.

2.6 SELECTION OF THE PREFERRED ALTERNATIVE

It is anticipated that the final contract language and the long-term contract renewal of the Preferred Alternative will represent a negotiated position between Alternatives 1 and 2. Therefore, it is anticipated that the impacts will be either equal to or less than those identified for Alternative 1, Alternative 2, or the No Action Alternative.

Table 2-2 is a Summary of Impacts by Alternatives.

TABLE 2-2
SUMMARY OF IMPACTS OF ALTERNATIVES

Resource	Description of Impact
NO ACTION ALTERNATIVE	
SOCIOECONOMICS (SECTION 4.3)	
Demographics	By 2026, Shasta County population would increase by about 50 percent from 1999 levels.
M & I Water Costs, Land Use and Economics	Based on 1994 dollars, Contractors would pay approximately $1.1 million in the year 2026 for untreated CVP M&I water during the average year hydrologic conditions.
Agricultural Water Costs, Land Use and Economics	Unlike the assessment of M&I water cost impacts, the agricultural water cost assessment is based on 1999 rates since the PEIS agricultural economic analysis was updated to 1999. Agricultural water for the Divisions are used by BVWD and CCCWD. BVWD irrigators are projected to use over twice as much CVP water on 25% more land as CCCWD irrigators. This disparity is explained by a greater portion of BVWD's cropping pattern is projected to be in pasture, a water intensive crop. For BVWD, during average conditions, the gross value of production in the year 2026 would be $1.95 million, and crop water use would be 13,500 acre-feet per year; and 5,960 acres would be irrigated based on 1999 dollars. For CCCWD, during average conditions, the gross value of production in the year 2026 would be $1.95 million, and crop water use would be 13,500 acre-feet per year; and 5,960 acres would be irrigated based on 1999 dollars.
Regional Economy	For the year 2026 in Shasta County: the estimated output for standard industrial sectors would be $4,742 million, Full-time equivalent employment would be 71,579, and Total Income would be $2,695 million.
LAND USE (SECTION 4.4)	Indirect effects could occur to agricultural uses due to rewording that would provide M&I water service to irrigated land less than or equal to five acres unless the Contracting officer is satisfied the use is irrigation. For BVWD, irrigated acreage would increase to 5,960 acres during average hydrologic year conditions, and to 5,890 acres for dry hydrologic conditions. For CCCWD, the irrigated acreage would increase to 4,690 acres and 4,640 acres for the average and dry hydrologic conditions, respectively.
BIOLOGICAL RESOURCES (SECTION 4.5)	Indirect effects to biological resources could occur as a result of changes to land use under the No Action Alternative.
ENVIRONMENTAL JUSTICE (SECTION 4.6)	No disproportionate effect on minority populations or low-income populations.
INDIAN TRUST ASSETS (SECTION 4.7)	No Indian Trust Assets are known to occur within water service areas. Therefore, no Indian Trust asset would be adversely affected by the No Action Alternative
CULTURAL RESOURCES (SECTION 4.8)	Indirect effects due to planned growth and development, or changes in land use from agricultural uses to suburban/urban uses, or suburban uses to agricultural uses. Changes in land use could affect known and undiscovered cultural resources. However both federal and state jurisdictions provide programs to protect cultural resources.

TABLE 2-2
SUMMARY OF IMPACTS OF ALTERNATIVES

Resource	Description of Impact
ALTERNATIVE 1	
SOCIOECONOMICS (SECTION 4.3)	
Demographics	Same as the No Action Alternative
M & I Water Costs, Land Use and Economics	Same as the No Action Alternative
Agricultural Water Costs, Land Use and Economics	Alternative 1 is expected to have similar effects on Agricultural water costs and associated land and water use, gross value of production, and farm net revenues for the affected water districts as the No Action Alternative. Therefore, there are no environmental impacts of this alternative.
Regional Economy	Same as the No Action Alternative
LAND USE (SECTION 4.4)	Same as the No Action Alternative
BIOLOGICAL RESOURCES (SECTION 4.5)	Similar direct and indirect effects as the No Action Alternative.
ENVIRONMENTAL JUSTICE (SECTION 4.6)	No incremental adverse effects
INDIAN TRUST ASSETS (SECTION 4.7)	No adverse impacts. Same as the No Action Alternative.
CULTURAL RESOURCES (SECTION 4.8)	No incremental environmental effects
ALTERNATIVE 2	
SOCIOECONOMICS (SECTION 4.3)	
Demographics	Long run decline of Shasta County population would be about 100 people or about 0.03% from the No Action Alternative.
M & I Water Costs, Land Use and Economics	The incremental effect would be that the Contractors would pay approximately $1.8 million more than the No Action Alternative in the year 2026 for untreated CVP M&I water during the average year hydrologic conditions.

TABLE 2-2
SUMMARY OF IMPACTS OF ALTERNATIVES

Resource	Description of Impact
Agricultural Water Costs, Land Use and Economics	Alternative 2 would cause BVWD agricultural water cost-of-service rate to increase by about 45% from No-Action level. Implementation of Alternative 2 could cause as many as 800 acres of irrigated pastureland to be fallowed in the BWVD during projected year 2026 during average hydrologic conditions (and even more, 1160 acres, under dry hydrologic conditions). The analyses indicate that in the year 2026 under average hydrologic conditions, BVWD farmers may reduce their use of CVP agricultural water by as much as 7,550 acre-feet, or more than half their 13,500 acre-feet of projected use under the No-Action Alternative. The fallowing of land, and reduction of applied water on lands that remain under irrigation due to Alternative 2 could reduce the annual gross value of agricultural production within the Bella Vista WD by approximately 6% (or $120,000 in 1999 dollars) and the net income realized by farmers by as much as $130,000 in 1999 dollars under average hydrologic conditions. In a dry year, the decline in gross production value and net revenue impacts could be $180,000 and $260,000, respectively (in 1999 dollars). Alternative 2 impact on Clear Creek agricultural cost-of-service water rates would increase about 20% and would be much lower than the impact on its CVP M&I cost-of-service water rates previously discussed for M&I. Under Alternative 2 as many as 510 acres of CCCWD projected year 2026 irrigated pastureland to be fallowed during a year of average hydrologic conditions (and 740 acres even under dry hydrologic conditions). In the year 2026, and assuming average hydrologic conditions, CCWD farmers may reduce their use of CVP agricultural water by as much as 3,250 acre-feet. The fallowing of land, and reduction of applied water on lands that remain under irrigation due to Alternative 2 could reduce the annual gross value of agricultural production within CCCWD by approximately 2% (or $80,000 in 1999 dollars). In a dry year, the decline in gross production value and net revenue impacts could be $120,000 and $140,000, respectively (in 1999 dollars).
Regional Economics	The County's industrial output could decrease by as much as $3.3 million (0.07%) when compared to the No Action Alternative. The County economy could decline from the No Action Alternative by as many as 46 jobs (less than 1%), and the regional income by place of work could decrease by almost $1.9 million dollars (0.07%) from the No Action Alternative.
LAND USE (SECTION 4.4)	Indirect effects would occur. The incremental effect for BVWD would be the increased fallowing of about 800 acres in 2026 under average conditions, and 1,160 acres under dry conditions. The incremental effect for CCCWD would be the increased fallowing of about 510 acres in 2026 under average conditions, and 740 acres under dry conditions.
BIOLOGICAL RESOURCES (SECTION 4.5)	Variable indirect effects would occur that could be beneficial or adverse, depending on the specific parcels, habitats, and species affected.
ENVIRONMENTAL JUSTICE (SECTION 4.6)	No incremental adverse effects
INDIAN TRUST ASSETS (SECTION 4.7)	No incremental adverse effects. Same as the No Action Alternative.
CULTURAL RESOURCES (SECTION 4.8)	No incremental environmental effects

CHAPTER 3

SUMMARY OF PREVIOUS ENVIRONMENTAL DOCUMENTATION

3.1 INTRODUCTION

The purpose of this chapter is to summarize the results of the documents prepared pursuant to the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) that have been completed and address environmental issues related to providing CVP water into the Shasta and Trinity Divisions and using the CVP water within the Shasta and Trinity Divisions. These documents include the Programmatic Environmental Statement (PEIS) for the Central Valley Project Improvement Act (CVPIA) and the associated Draft Biological Opinion, and the Environmental Impact Report (EIR) for the Shasta County General Plan.

Following completion of the PEIS, Reclamation prepared additional environmental documentation for renewal of long-term water service and repayment contracts, including this Environmental Assessment (EA) to address the site-specific impacts relating to contract renewals within the Shasta and Trinity Divisions.

It should be recognized that under each of the descriptions presented in this chapter, references to "No Action Alternative" and other alternatives are specific to the reference documents, not to the alternatives described in the remaining chapters of this EA.

3.2 PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

On October 30, 1992, the President signed into law the Reclamation Projects Authorization and Adjustment Act of 1992 (Public Law 102-575) that included Title XXXIV, the CVPIA. The CVPIA amended the previous authorizations of the CVP to include fish and wildlife protection, restoration, and mitigation as project purposes having equal priority with irrigation and domestic uses and fish and wildlife enhancement as a project purpose equal to power generation. Through CVPIA, Interior is developing policies and programs to improve environmental conditions that were affected by operations, management, and physical facilities of the CVP. The CVPIA also includes tools to facilitate larger efforts in California to improve environmental conditions in the Central Valley and the San Francisco Bay-Delta system. The PEIS addressed potential impacts and benefits implementing provisions of the CVPIA. The PEIS was prepared by Reclamation and the U.S. Fish and Wildlife Service (USFWS).

The analysis in the PEIS was intended to disclose the probable region-wide and cumulative effects of implementing the CVPIA and provide a basis for selecting a decision among the alternatives. The PEIS was developed to allow subsequent environmental documents to incorporate PEIS analysis by reference and limit the need to re-evaluate the region-wide and cumulative impacts of CVPIA. In

some cases, worst-case assumptions were used to maximize the utility of the analysis for tiering within the scope of the impacts analyzed in the PEIS.

As the project-specific actions are considered, the lead agencies must determine if the specific impacts were adequately analyzed in the PEIS. If the actions under consideration were previously evaluated and the impacts of such actions would not be greater than those analyzed in the PEIS or would not require additional mitigation measures, the actions could be considered part of the overall program approved in the PEIS Record of Decision (ROD). In such a case, an administrative decision could be made that no further environmental documentation would be required. If a tiered document is appropriate, the tiered document may be an EIS or an EA. The tiered documents can use the PEIS by reference to avoid duplication and focus on new alternatives or more detailed site-specific effects. Therefore, only changes from the alternatives considered in the PEIS, and impacts not previously addressed, would be addressed in detail in the tiered documents.

3.3 LOCALIZED IMPACTS OF PEIS ON PREFERRED ALTERNATIVE

The primary impact to CVP water service contractors, as described in the PEIS, is not due to the contract provisions, but rather to the implementation of CVPIA. The re-allocation of CVP water to fish and wildlife purposes under CVPIA reduced average annual CVP water deliveries to water service contractors from 2,270,000 acre-feet/year under the PEIS No Action Alternative, to 1,933,000 acre-feet/year under all of the PEIS alternatives, including the Preferred Alternative. The reduction occurred differently for various classifications for users, as summarized below.

- Average Annual CVP Water Deliveries for Agricultural water service contractors located in the Shasta and Trinity Divisions decreased 12 percent from pre-CVPIA Affected Environment conditions.

- Average Annual CVP Water Deliveries for Municipal water service contractors located in the Shasta and Trinity Divisions decreased 4 percent from pre-CVPIA Affected Environment conditions.

- There was no change in deliveries to water rights holders, Sacramento River Settlement Contractors, or Delta Mendota Exchange Contractors under CVPIA implementation.

3.4 SHASTA COUNTY WATER RESOURCES MASTER PLAN PHASE I REPORT - CURRENT AND FUTURE WATER NEEDS

The Shasta County Water Resources Master Plan (October 1997) was prepared for the Redding Area Water Council and other Shasta County water users. As an initial step in regional water supply planning to meet future needs in the Redding Basin, a diverse assemblage of entities including water purveyors, industries, and private interests formed a group to identify current and long-term water supply needs throughout Shasta County. Through this effort, the study sponsors developed a program for regional planning to meet the current and future needs for water users within and outside the Redding Basin. The Phase 1 study provides the basic factual information upon which subsequent work can be premised. Phase 2 will include preparing a Groundwater Management Plan (Assembly Bill [AB] 3030 Plan), a groundwater model, and an Integrated Resource Plan. Phase 3 will involve

developing implementation and financial plan for the recommended alternative. The implementation plan will also include compliance under CEQA.

The document provides a description of the hydrographic basin, specific background information for each of the water purveyors and service areas, land use, water supplies and needs, and an annual water budget. This information was used extensively to describe and quantify conditions within the Affected Environment section of this EA.

3.5 USE OF OTHER PLANNING DOCUMENTS

Under state planning law, each city or county must adopt a comprehensive, long-term general plan for future planning and development. A General Plan is not a detailed, parcel-specific, policy statement. Instead, it establishes a generalized pattern of future land use which provides the basis for more detailed, site-specific plans.

Existing general plans and their supporting documents were used in the preparation of this EA, providing background information for resource-specific discussions of the Affected Environment. The City of Redding (Draft March 2000) and the City of Shasta Lake (March 1999) have each adopted a General Plan. The two cities represent the minority of the Shasta and Trinity Divisions service area. The majority of the service area falls within unincorporated portions of Shasta County. In these areas, land use planning is subject to guidelines identified in the Shasta County General Plan (October 1998). Other documents used in the preparation of this EA include Water Conservation Plans for Bella Vista Water District (January 1995), Clear Creek Community Services District (CSD) (November 1994), City of Redding (undated, assume 1994), and City of Shasta Lake (March 1994).

3.6 FOCUS OF THE ENVIRONMENTAL ASSESSMENT

The scope of this analysis in this EA is limited to existing available sources including but limited to Final CVPIA Programmatic EIS (1999). This EA specifically evaluates the incremental effects of Alternative 1 and Alternative 2 on socioeconomic resources. Socioeconomic resources are evaluated to describe potential incremental impacts resulting from the proposed revised pricing structure which is part of the proposed action. Potential secondary effects to other resources due to direct effects on socioeconomic resources are described in the EA sections on: land use, biological resources, trust assets, environmental justice, and cultural resources.

CHAPTER 4

AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND ENVIRONMENTAL COMMITMENTS

4.1 INTRODUCTION

CONTRACT SERVICE AREA DESCRIPTION

The Shasta and Trinity Divisions is comprised of the Bella Vista Water District (BVWD), Clear Creek Community Services District (CCCSD), City of Redding (Buckeye Area), City of Shasta Lake, Shasta Community Services District (SCSD), Shasta County Water Agency (SCWA), and three other smaller contractor service areas (Keswick County Service Area [KCSA], Mountain Gate Community Services District [MGCSD], and U.S. Forest Service [USFS] Centimundi Boat Ramp). Table 4.1-1 describes features of each long term water service contractor within the Shasta and Trinity Divisions and Figure 1-2 shows the approximate service boundary of the long term water service contractors.

The Shasta and Trinity Divisions are entirely located within Shasta County, and falls within the Redding Basin, Drainage Area Units (DAU) 141 and 143 with minor areas in outlying DAUs 136 and 145. Water is supplied for irrigation, domestic, industrial, commercial, or recreational uses, or a combination of these uses. The location, history, service area, and water supply sources of the each major long term water service contractor is described in this section. As shown on Table 4.1-1, the major long-term water service contractors are Bella Vista Water District and Clear Creek Community Services District. Bella Vista WD and Clear Creek CSD account for more than 72 percent of all CVP water delivered to long term water service contractors in the Shasta and Trinity Divisions. The discussions in the following sections address the major water service contractors in the Shasta and Trinity Divisions.

TABLE 4.1-1
FEATURES OF SHASTA AND TRINITY DIVISIONS LONG-TERM SERVICE CONTRACTORS

Contractor Name	Shasta or Trinity Division	Contract Number	Maximum Water Quantity of CVP Long Term Contract Water (Acre-Feet)	Note	% of the Diversions Total Water Quantity	Reclamation M&I Rate Assigned	Reclamation Ag Rate Assigned	Service Boundary Area (Acres)	Total Connections (3)		Pre-CVPIA Expiration
									M&I	Ag	
Bella Vista Water District	T	851AIR3	**24,000**		44%	x	x	3,395	4538	615	2/29/00
City of Redding	S	5272A	**6,140**	(1)	11%	x	o				
Spring Creek Conduit (Buckeye)	S	5272A	Included			-	-	17,220	4,179	0	12/31/09
Sacramento River (Buckeye)	S	5272A	Included			-	-	Included	-	0	12/31/09
Toyon Pipleine (Buckeye)	S	5272A	Included			-	-	640	58	0	12/31/09
City of Shasta Lake	S	W1134IR4	**2,750**		5%	x	o	7,785	3,773	0	2/29/00
Shasta Dam Area P. U. D.		nav	Included			-	-		-	-	
Summit City P.U. D.		nav	Included			-	-		-	-	
Clear Creek Community Services District	T	489AIR3	**15,300**		28%	x	x	14,314	1,707	784	2/29/00
Shasta Community Services District	T	862A	**1,000**		2%	x	o	6,400	717	0	12/31/03
Shasta County Water Agency	S	3367A	**5,000**	(2)	9%	x	x	nav	nav	**?**	12/31/04
Others			**860**		2%	x	o				
Keswick Community Services District	T	1307A	500		0.91%	x	o	5,500	191	0	12/31/09
Mountain Gate Community Services District	S	6998	350		0.64%	x	o	4,160	650	0	12/31/03
U. S. F. S. (Centimundi Boat Ramp)	S	3464A	10	(3)	0.02%	o	x		nav	0	
Total			**55,050**		100%			59,414			

NOTES
(1) City has 6,140 acre-feet under "Buckeye" contract.
(2) SCWA principally subcontracts CVP water to others; ag water not used since 1983.
(3) Information provided by contractor on September 20, 2000
nav = information not available

4.2 WATER SUPPLIES AND FACILITIES OPERATIONS

4.2.1 DESCRIPTION OF EXISTING SHASTA AND TRINITY DIVISIONS AND FACILITIES

Bella Vista Water District

The Bella Vista Water District (BVWD) is located generally east of the City of Redding and south of Shasta Lake. BVWD is bounded on the south generally by State Highway 44, and extends east to slightly beyond Little Cow Creek. This area also includes an overlapping eastern part of the City of Redding and the rural communities of Bella Vista and Palo Cedro. The district currently has 4,538 residential connections and 615 agricultural connections.

BVWD is a publicly owned water agency formed in 1964 under California Water Code Division 13, Sections 34000 through 38501. The district was formed to serve agricultural irrigation demands, which still represent 70 to 80 percent of the district's water demand. However, most of the service connections are now either domestic or rural residential.

Urban uses predominate within the southeast corner of the district where sewage disposal facilities are available. Residential uses, with lot sizes between 1 and 5 acres, are dispersed across the rest of the district. Agricultural uses are almost exclusively confined to the fertile soil along Stillwater Creek and Cow Creek. Pasture represents the bulk of agricultural use, but there is a broad array of other crops as well. The most significant industrial use is a large catfish farm.

BVWD's primary water source is the Sacramento River. The appropriated water is authorized from the Cow Creek Unit of the Trinity River Project, which is part of the USBR's Central Valley Project (CVP). This source allows for up to 24,000 acre-feet per year from BVWD's original contract and 578 acre-feet per year of CVP water purchased through the Shasta County Water Agency. Both of these allotments are subject to reduction during dry years. In the very severe drought years of 1991 and 1992, the reduction was 25 percent on the water used for municipal and industrial uses and 75 percent on agricultural uses. Available surface water was supplemented with groundwater from wells located near the southern boundary of the district. These reductions in supply caused severe drought restrictions to be imposed, which have had a continuing impact on district water sales in subsequent years. The supplementary water provided by the wells constitutes about 10 percent of the supply normally available from the river and about 15 to 20 percent of the reduced supply during a severe drought year. The aquifers within the district have limited yield, so it is not practical to greatly increase production of wells within the district.

The BVWD supply system consists of the Wintu Pump Station on the Sacramento River and five wells. Water pumped from the river is treated at the district's treatment plant, which provides in-line filtration. Distribution facilities include a network of transmission and distribution pipelines, three storage tanks, nine booster pump stations, and pressure-reducing facilities. The major distribution piping was installed by the USBR, but has been extended considerably to serve many subareas. Funding for initial system construction was through an extension of the CVP for the main supply facilities and through a loan from the USBR for the distribution system. The main supply system is

still owned by the U.S. Government, but was constructed solely for use by BVWD. Both domestic and agricultural users are served through the same distribution system, so all water is treated to meet the higher water quality standards for domestic use. BVWD also purchases CVP water from Shasta County Water Agency (described in following section).

City of Redding (Sacramento River, Spring Creek, Toyon) (Buckeye Contract)

The City of Redding is the largest city in Shasta County with a population of approximately 78,000 (1999). Prior to 1941, water service within the City of Redding was provided by the California Water Service Company, whose water rights dated from 1886. The City acquired the local facilities and water rights of the company in 1941 and filed for additional appropriative water rights of 5 cubic feet per second (cfs) in 1944. Subsequent annexations to the City's service area include the Buckeye County Water District, the Cascade Community Services District, and the Enterprise Public Utility District in 1967, 1976, and 1977, respectively. The City provides water service to about 24,709 (09/00 personal communications) service connections. All connections are municipal and industrial uses with only incidental agricultural uses.

The City currently administers the Buckeye Contract under a CVP long-term contract renewal. The Buckeye Contract service area includes two City of Redding pressure zones: Buckeye and the Summit City. Approximately half of the Buckeye zone is located within the City limits, and the other half is in the unincorporated area of Shasta County. The Summit City zone falls entirely within the unincorporated area of Shasta County. There are 4,179 connections in the Buckeye zone. The Buckeye zone receives water from Whiskeytown Lake via the Spring Creek conduit. During peak demand periods, supplemental water is pumped from the Sacramento River, then treated, and delivered into the Buckeye Contract service area at the CVP price. The 58 M&I connections in the Summit City zone are supplied exclusively by water diverted from Shasta Lake via the Toyon pipeline. The water is treated by the City of Shasta Lake and delivered to the Summit City Zone at the CVP price. There are no groundwater resources within the Buckeye Contract service area.

Redding's 1966 Settlement Contract with USBR specifies a "Base Supply" and a "Project Water Supply." The Base Supply was 15,385 acre-feet in 1995 and increases 255 acre-feet per year. The Project Water Supply was 2,715 acre-feet in 1995 and increases 45 acre-feet per year. The total 1996 entitlement was 18,400 acre-feet. The City's CVP long-term water service contract provides 9,290 acre-feet (according to PEIS data sources).

The City's surface-water supply comes from the Sacramento River and Whiskeytown Lake. Sacramento River water is treated at the 24 million gallons per day (mgd) Foothill Water Treatment Plant, and the Whiskeytown Lake water is treated at the 7 mgd Buckeye Water Treatment Plant.

Redding supplements its surface-water supply with well production capacity from the Redding Groundwater Basin. Currently, 14 wells are operational, providing a total capacity of up to 12 mgd. The well systems are used to supplement the City's Surface-water supplies, primarily during peak demand periods. The return flow of groundwater to the river from the City's wastewater treatment facilities contributes to water supplies for downstream users.

City of Shasta Lake

The City of Shasta Lake was incorporated in 1993. Prior to incorporation, utility services, including water supply, were provided by the Shasta Dam Area Public Utilities District (PUD). The PUD was formed in 1945 to provide a reliable water supply for an area of 3.5 square miles. Prior to formation of the PUD, water was supplied by a series of wells of low and unreliable yield. Originally the PUD's service area was a residential area established to house workers constructing Shasta Dam. The USBR constructed a water transmission pipeline from Shasta Lake to the PUD in 1948 and concurrently the PUD constructed water storage and distribution systems. The Summit City PUD was annexed in 1978.

Today, the City provides water service to 3,509 service connections. Urban and residential land uses predominate.

Water is obtained exclusively from Shasta Lake via a pump station at Shasta Dam, with a maximum diversion of 5.0 mgd. An interim contract with USBR (Contract No. 4-7-20-w1134-IR2) provides an allocation of 2,750 acre-feet per year from this source. Reclaimed water is also available for industrial and landscaping use from the City's recently expanded 30 acre-feet per year, in addition to 420 acre-feet in storage. The proposed Knauf Fiber Glass plant proposes to use reclaimed water for industrial purposes, but surplus capacity will remain. Groundwater use is limited because of low aquifer yields.

Clear Creek Community Services District

In 1891 the Happy Valley Irrigation District was formed. The source of water was Rainbow Lake. The water users attempted to buy the canal system from Dry Creek Flume and Tunnel Company, through the District, but negotiations were unsuccessful. In 1902 the Happy Valley Land and Water Company was formed and sold stock to the farmers and non-resident land owners with the understanding that each share of stock carried water for one acre of land. The land value dramatically increased. The Ehmann Olive Company bought 2,000 acres for an olive ranch. Happy Valley Land and Water Company's revenues were not sufficient to do necessary maintenance. Eventually the Happy Valley Irrigation District was formed (using the same name as the District formed in 1891). The Legislature passed an Act in 1917 validating the organization of the District. Such an Act assured the stability of Irrigation District Bonds. The Happy Valley Irrigation District eventually went bankrupt, and residents were left only with private wells. Clear Creek Community Services District was formed in 1961. The facilities were designed and constructed by USBR and the district began its operation in 1967.

The District presently encompasses about 14,314 acres with the inclusion of several large annexations. At the present time, of the 14,314 acres within the District's service area there are approximately 5,817 acres of irrigated agriculture, approximately 4,000 acres for rural residential receiving M&I water and approximately 4, 497 acres undeveloped.

The District developed the first of three proposed wells and installed 13,800 feet of 18" pipeline to connect the ground water supply to the distribution system. The system and single well went on-line in October, 1992. These wells are intended for use only when surface supplies are inadequate to meet demand, or for emergencies.

The majority of the developed agricultural property in the district is ditch or flood irrigated. The balance of irrigation is done overhead and on drip system.

The District's population is scattered within a rural environment and no urban centers exist. The District's population has, in recent years, been increasing at about a 2 to 3 percent annual rate due to its attractive small farm atmosphere where residents can have a few head of cattle on several acres of irrigated pasture. It is for this reason the District has projected a population increase of 17 percent to the year 1998 (7,000 in 1994 to 8,000 in 1998).

The Clear Creek Community Services District is located approximately ten air miles southwest of Redding and six air miles west of Anderson in Southern Shasta County. The District is situated on a plateau, which rises from the floor of the Sacramento Valley. The plateau ranges in elevation from 450 to 900 feet and is dissected by deep washes that provide seasonal drainage. The District includes the rural areas known as Olinda and Cloverdale. The overall general area served by the District is commonly referred to as Happy Valley.

The source of the District's water supply is Whiskeytown Lake, a reservoir formed by Clear Creek waters impounded by Whiskeytown Dam. The reservoir covers about 3,250 acres at maximum capacity providing water storage of about 241,000 acre feet. The reservoir provides the capacity to regulate the flows of the Clear Creek watershed and the imported flows from the Trinity River which discharge through the Carr Powerhouse into the reservoir. Releases are made from the reservoir to the Sacramento River through the Spring Creek Tunnel and downstream through Clear Creek. Water is diverted to the District through two intakes in the earthen filled dam structure, one at an elevation of 1,110 feet, the other at an elevation of 965 feet. The selection of depth gives the District the capacity to draw less turbid water.

The District is served by an aqueduct which begins at outlets in Whiskeytown Dam and terminates at a 250,000 gallon control tank about eight and one half miles South of the Dam. This aqueduct, commonly called the Muletown Aqueduct (also Muletown Conduit), consists of about 27,500 feet of 45 inch pipe and 17,400 feet of 42 inch pipe buried in a rather torturous route along Muletown Road, paralleling Clear Creek. The coal tar enamel lined and coated steel pipe was installed in 1965. The District's water system, designed and constructed by the USBR, was completed and the District began its operation in 1967. The distribution system within the District boundaries consist of approximately 75 miles of pipe ranging in size from 42 inches down to 2 inches.

The District has one storage tank along the conduit with a one million gallon capacity. There is also one control tank for pressure regulation at the head of the District with a 250,000 gallon capacity. The storage tank at the booster station facility, outside District boundaries is 32,000 gallons.

Shasta Community Services District

The Shasta Community Services District (SCSD) is located west of the City of Redding. SCSD was formed in June 1959, under the Community Services District Laws, Sections 61000 through 61934 of the Governmental Code of the State of California. The district was formed for the primary purpose of supplying water for domestic use and fire protection to the town of Shasta and adjacent developed areas of the district. The district currently serves 630 connections. Virtually all of the active land use is municipal, serving ranchettes.

Congress authorized a water system for the area as part of the Trinity River Project. Bonds were issued by SCSD to finance construction of the transmission and distribution systems and have since been repaid.

CVP long- term service contract water is provided for up to 1,000 acre-feet annually. Water is supplied by gravity from Whiskeytown Lake via a turnout on the Spring Creek Conduit. The Spring Creek Conduit is the only source of supply and there is only 0.30 million gallons of storage located near the source. Downstream of the turnout, a single transmission main serves as the backbone of the distribution system and most mains are not looped.

SCSD has historically been vulnerable to disruptions in supply from its USBR contract. During the 1991 drought the USBR reduced SCSD's allotment by 75 percent to 250 acre-feet per year. Groundwater wells are not feasible because the district does not overlay an aquifer.

Shasta County Water Agency

The Shasta County DWR was created in 1954 to organize Shasta County's efforts in conjunction with the Trinity River Project. This led to the formation of the SCWA in 1957 through the Shasta County Water Agency Act, Legislative Act 7580. The SCWA was created to control and conserve surface water for the beneficial use and protection of life and property of the people of Shasta County. Funding for the SCWA comes from County property taxes.

The SCWA actively promotes the creation of public water and sewer systems. The agency was instrumental in the creation of BVWD, Centerville Community Services District, CCCSD, and SCSD, as well as six county service areas for water and two for sewer service.

In 1967, the SCWA negotiated a 37-year contract with USBR for 5,000 acre-feet of "Project Water" or replacement water. This water is wholesaled to 14 subcontractors throughout the County. "Project Water" may be used for municipal, industrial, and domestic use, and replacement water may be used for agricultural purposes and/or municipal, industrial, and domestic uses.

Other Shasta and Trinity Divisions CVP Contractors

Three smaller water districts are included in the Shasta and Trinity Divisions. The three districts comprise about 1 percent of the CVP long-term contract water supply to the Division.

Keswick

The Keswick Community Services District (KCSD) is presently called the Keswick County Service Area (KCSA), and is located west of the City of Redding. KCSA was preceded by the KCSD, which was formed in the early 1960s under the Community Services District Laws, Sections 61000 through 61934 of the Governmental Code of the State of California. The District was formed for the primary purpose of supplying water for domestic use and fire protection to the town of Keswick and adjacent developed areas. Congress authorized a water system for the area as part of the Trinity Project Act (69 Stat. 719) and the facilities were constructed in 1965. A repayment schedule was established whereby the Federal Government is reimbursed by KCSA for transmission and distribution system construction costs. However, upon completion of repayment, ownership of all project facilities will still remain with the Federal Government. On October 23, 1990, the Keswick Community Services District was dissolved and reorganized as the Keswick County Service Area under Sections 25210.1 through 25250 of the Governmental Code of the State of California. KCSA currently serves 195 connections, which are concentrated in the town of Keswick. The district boundaries encompass facilities not served by the district, including Keswick Dam and the Spring Creek Diversion Dam. The land uses served by KCSA are exclusively ranchettes.

Federal CVP water is provided under the terms of a contract with USBR. The contract provides for deliveries of up to 500 acre-feet annually. Water is supplied by gravity flow from Whiskeytown Lake via a turnout on the Spring Creek Conduit, which feeds the Spring Creek powerhouse. Two storage tanks provide total storage of 0.2 MG.

Mountain Gate Community Services District

Mountain Gate Community Services District (MGCSD) is located north of the City of Shasta Lake. MGCSD was formed pursuant to Government Code, Title 6, Division 3, Sections 61000 through 61800. MGCSD was initially formed in 1956 to provide water service within a 2-square-mile area. MGCSD currently provides water service to 593 connections. In addition, the district provides fire protection services in its service area. The primary land use is ranchettes. Other significant uses are urban and industrial.

MGCSD obtains CVP water from Shasta Lake, under the terms of a contract with the USBR for 350 acre-feet per year. This contract allotment is supplemented by an additional 1,000 acre-feet via a contract with the SCWA. The district also operates three wells within a small usable aquifer. These wells supply nearly half of MGCSD's total needs annually. The distribution system consists of 29 miles of pipelines serving 3,750 acres within the MGCSD, in addition to Bridge Bay Resort, which is located on the U.S. Forest Service land adjacent to Shasta Lake. There is no storage within the district.

U.S.F.S Centimundi Boat Ramp

The Centimudi boat ramp is part of the original Centimudi Marina Project located east/southeast of Shasta Dam. The Memorandum of Agreement signed November 8, 1967 between the USFS and the BOR (Contract No. 14-06-200-3464A) stipulated that the USFS could divert up to 10 acre-feet of

municipal, industrial, and domestic water from the Toyon Pipeline to supply the Centimudi Marina Project. The Toyon Pipeline, a BOR facility, originated from the left abutment of Shasta Dam and diverted water to a point near the Government Camp at Toyon (west of the City of Shasta Lake). The USFS agreed to construct, operate, and maintain the pipelines, pumps, and meters to facilitate the water diversion. Further, the USFS agreed to assume responsibility for controlling and distributing the water. Currently the Marina is serviced by the Shasta Community Services District.

4.2.2 ENVIRONMENTAL CONSEQUENCES

No Action Alternative

Under the No Action Alternative, it is assumed that the contractors in the Shasta and Trinity Divisions would receive their existing water supply. Without tiered pricing as a consideration, the available water supply would depend on climate conditions and project operating rules. Over the long run, future water supplies are expected to be consistent with historic conditions provided no long term climate changes occur. With tiered water pricing, the higher cost of tier 2 and tier 3 prices would be available only in years when Reclamation is able to provide 80 percent of the water allocated to all CVP contractors.

Alternative 1

Under Alternative 1, the water pricing structure would not change from the No Action Alternative. Therefore, water supply would be the same as under the No Action Alternative.

Alternative 2

Under Alternative 2 the quantity of water is the same as the No Action Alternative. Alternative 2 assumes that the sum of the category 1 and 2 water is equal to the maximum quantity provided in the contractors' existing water service contract.

4.2.3 CUMULATIVE EFFECTS

Alternatives 1 or 2 are expected to result in only minor changes in water supply compared to the No Action Alternative, therefore no cumulative effects are anticipated to the year 2026.

4.3 SOCIOECONOMICS

4.3.1 AFFECTED ENVIRONMENT

All of the water contractors and service areas within the Shasta and Trinity Divisions of the CVP potentially affected by CVP long-term water contract renewal are located in Shasta County. Accordingly, Shasta County was selected as the regional area of influence for the demographic, land use and economic impact evaluation of Alternatives 1 and 2. To be consistent with the time frame of the affected environment discussion of the CVPIA PEIS, to the extent available, 1994/95 data are used to characterize the affected environment for the evaluation of the CVP contract renewal alternatives under consideration.

Demographics

Table 4.3-1 presents recent population estimates for Shasta County. The table indicates that the County's population in 1999 was estimated at 171,211 (California Department of Finance [CDOF], 2000a).

TABLE 4.3-1
SHASTA COUNTY POPULATION

Year	Total	White	Hispanic	Asian and Pacific	Black	American Indian
1995	160,877	145,282	6,935	3,583	1,142	3,935
1999	171,211	153,618	7,786	4,316	1,227	4,264

Source: CDOF, 2000a

In 1999, approximately half of the Shasta County population resided in the County's largest city, Redding. In January of 1999, Redding's population was approximately 78,500, little changed from 1994. The County's next largest city, Shasta Lake, had a reported 1999 population of about 9,300 people. Approximately 40 percent, or 68,000, of Shasta County's residents live in unincorporated areas (CDOF, 2000a).

Table 4.3-2 characterizes the overall housing situation within Shasta County. The table indicates that the County's housing vacancy rate was approximately 7.4 percent of existing housing units in 1999 (CDOF, 2000b).

TABLE 4.3-2
SHASTA COUNTY HOUSING (1999)

Housing Stock	71,042
Single Family	47,633
Multiple Family	11,136
Mobile Homes, Trailers, etc.	12,273
Vacancy Rate	7.4%
Occupants per househoud	~2.5

Source: California Department of Finance 2000b

There are a total of nine separate water districts/agencies (districts) within the Shasta and Trinity Divisions of the CVP that currently receive CVP water designated for M&I uses through contracts undergoing the contract renewal process (referred to as contract water). Table 4.3-3 presents 1994 estimates of the population served by the four largest of these districts, Bella Vista Water District (BVWD), Clear Creek Community Services District (CCCSD), City of Shasta Lake and City of Redding (CDWR 1994). In 1994, these districts together received almost 85 percent of the total CVP M&I contract water that was delivered to Shasta and Trinity Divisions.

TABLE 4.3-3
POPULATION SERVED WITHIN SELECTED WATER DISTRICTS (1994)

	Bella Vista	Clear Creek	City of Shasta Lake	City of Redding
Population Served	15,700	8,000	9,820	78,266

Source: California Department of Water Resources 1994

Municipal and Industrial Water Costs, Land Use, and Economics

The water contractors identified in Table 4.3-3 treat and then deliver CVP and other water to residential, commercial and industrial customers within their service areas. Table 4.3-4 itemizes the number of M&I service connections reported by each district in 1994, by service connection category.

TABLE 4.3-4
M&I SERVICE CONNECTIONS WITHIN SELECTED SHASTA AND TRINITY DIVISIONS BY M&I CATEGORY (1994)

Service Connection Category	Bella Vista	Clear Creek	City of Shasta Lake	City of Redding
Single Family Residential	2,833	1,441	2,997	18,643
Multi-family Residential			289	456
Commercial / Institutional	158		189	3,837
Industrial		1	5	464
Other (government)				195
Landscape Irrigation				3
Other (rural)	864			
Total	3,855	1,442	3,480	23,598

Source: California Department of Water Resources 1994
*Some of the districts do not report separately for single and multi-family residential connections.

Table 4.3-5 presents estimated water deliveries by service connection category for each of the water districts presented in Table 4.3-4. All of these water deliveries were metered, except the City of Redding's deliveries to its landscape irrigation users. The table indicates that about half of the City of Redding's 1994 M&I water deliveries were for landscape irrigation purposes. (A review of their reported customer water deliveries in 1999 indicates that deliveries categorized under landscape irrigation were greatly reduced in that year from the 1994 levels. At the same time, the City's reported single-family residential deliveries increased substantially despite little change in the Redding service area population.)

TABLE 4.3-5
1994 DELIVERIES OF TREATED WATER TO M&I CUSTOMERS BY M&I CATEGORY
(ACRE-FEET PER YEAR)

Service Connection Category	Bella Vista[a]	Clear Creek	City of Shasta Lake	City of Redding
Single Family Residential	2,030	471	1,573	12,520
Multi-family Residential			110	258
Commercial/Institutional	1,401	2	333	7,524
Industrial			74	476
Other (government)				566
Landscape Irrigation				21,354
Other (rural)	1,891			
Total	5,321	474	2,090	42,699

Source: California Department of Water Resources, 1994

Table 4.3-6 presents the estimated M&I deliveries of CVP water in 1994 to each of the nine CVP Shasta and Trinity contractors that receive CVP water designated for M&I uses (BOR 2000).

TABLE 4.3-6
CVP CONTRACT MAXIMUM, M&I DELIVERIES AND ESTIMATED COST (1994)

	Mt. Gate	City of Shasta Lake	USFS Redding	Shasta County Keswick	Shasta CSD	Shasta County WA	Bella Vista WD	Clear Creek CSD	City of Redding
CVP Contract Maximum (acre-feet)	350	2,750	10	500	1,000	5,000	22,000	15,300	9,250[1]
M&I Deliveries (acre-feet)	350	2,410	10	158	593	1,267	5,567	1,928	2,822
1994 Cost-of-Service Rate (per acre-feet)	$9.00	$13.82	$20.00	$13.17	$10.77	$19.44	$39.00	$26.09	$11.40
Total Estimated Cost	$3,150	$33,306	$200	$2,081	$6,387	$24,630	$217,113	$50,302	$32,171

Source: Bureau of Reclamation 2000a, Bureau of Reclamation 1994a, Dornbusch & Company
1. Includes 3,150 of settlement water.

A comparison of Tables 4.3-5 and 4.3-6 indicates that BVWD, CCCSD, and the City of Shasta Lake WD receive the majority of their M&I water through CVP long-term renewal contracts. The disparity between Clear Creek's 1994 CVP deliveries (1,928 acre-feet) and the district's treated deliveries to its M&I customers (474 acre-feet) may be explained by the fact that Clear Creek WD sells some of its M&I water to other districts, including BVWD. A comparison of the two tables also reveals that only a relatively small portion of the City of Redding's M&I water comes from its contract water.

Table 4.3-6 also presents the 1994 M&I contract cost-of-service rates published by the Bureau of Reclamation applicable to each district's contract water. The table shows the estimated total cost-of-service incurred by each district in that year based on their recorded CVP M&I contract water deliveries. In 1999, the City of Shasta Lake WD's average household water bill per 1,000 cubic feet of water was approximately $15.40 (CSL 2000). This translates to about $670 per acre-foot. (One acre-foot of water equals 43,560 cubic feet of water.) In 1999, the City of Shasta Lake paid a cost-

of-service rate for untreated CVP water of $15 per acre-foot (compared to $13.82 in 1994 as shown in Table 4.3-6). Accordingly, the actual average cost of CVP water treated and delivered to residential customers within the City of Shasta Lake in 1999 was almost 45 times the cost-of-service rate that they paid for that water. This is to be expected since an M&I district's cost of untreated water is usually a relatively small component of its cost to treat, store and deliver water to its customers (and thus the rates charged to its customers). Similar findings would be expected for the other Shasta and Trinity Divisions water districts.

Agriculture Water Costs, Land Use, and Economics

Both BVWD and CCCSD supply treated contract water designated for agricultural purposes to irrigators within their service areas. In 1996 a total of 7,319 acres of land within the two districts that were designated for CVP agricultural water use were irrigated with CVP water: 3,388 acres in BVWD and 3,931 acres in CCCSD (Bureau of Reclamation 1996). The districts together received approximately 10,000 acre-feet of CVP agricultural contract water in 1994 (purchases from other CVP contractors aside). While field, vegetable and fruit crops are all grown within the County, and the districts themselves, pasture is by far the predominant crop, representing about 50 percent of irrigated agriculture in the County. Table 4.3-7 summarizes the cropping pattern for each district as reported to the Bureau of Reclamation for 1996. The table indicates that like Shasta County as a whole, a large portion of the both districts' irrigated lands is in pasture, particularly BVWD.

TABLE 4.3-7
CROPPING PATTERN (1996)

Crop / Crop Group	Bella Vista WD (acres)	Percentage of Total	Clear Creek CSD (acres)	Percentage
Pasture	2,813	84.7%	1,785	48.5%
Alfalfa	217	6.5%	25	0.7%
Sugar Beets		0.0%		0.0%
Other Field Crops	176	5.3%	738	20.0%
Rice		0.0%		0.0%
Truck Crops	1	0.0%	86	2.3%`
Tomatoes	1	0.0%	30	0.8%
Deciduous Orchards	52	1.6%	993	27.0%
Small Grain	63	1.9%		0.0%
Subtropical Orchard		0.0%	24	0.7%
Total	3,323		3,681	

Source: Bureau of Reclamation 1996 and Dornbusch & Company 2000

The Census of Agriculture reports that in 1997 there were 850 farms in Shasta County of which 605 have some or all of their land under irrigation. Total irrigated acreage within the County reported in 1997 was approximately 38,863 acres (NASS 1999). Accordingly, lands receiving CVP water designated for irrigation with CVP agricultural water within the BVWD and CCCSD represent about 20 percent of the County's total irrigated land-base.

Much of the irrigated lands in Shasta County, and in particular, Bella Vista and Clear Creek, are on relatively small parcels. The 1997 Agricultural Census indicates that over half of the irrigated farms within Shasta County are less than 9 acres in size. Table 4.3-8 shows the agricultural service connections and customer water deliveries reported by BVWD and CCCSD in 1994. The table also shows the estimated average amount of land per agricultural service connection in each district, 6.5 acres in Bella Vista and 5.5 acres in Clear Creek. (This is calculated by dividing the estimated amount of irrigated acres in each district in 1996 by the number of agricultural connections in 1994. Acreage in 1996 was used because the Bureau of Reclamation was unable to provide accurate irrigated acreage information from 1994. Discussions with local extension agents and others familiar with irrigated farming in Shasta County suggested that the irrigated land base in Bella Vista and Clear Creek service areas changed little between 1994 and 1996. Accordingly, the calculation of irrigated land per connection is deemed reasonable.)

CCCSD reports that in 1999 there were 350 and 338 parcels between two and five acres in size within the CCCSD and BVWD service areas, respectively, that receive CVP agricultural water (McNeill 2000). Based on the values presented in Table 4.3-8, these 2- to 5-acre parcels account for about 50 percent and 65 percent of Clear Creeks and Bella Vista's agricultural service connections.

TABLE 4.3-8
AGRICULTURAL CONNECTIONS AND WATER DELIVERIES (1994)

	Bella Vista	Clear Creek
Irrigated Land (acres) 1996	3,388	3,931
Agricultural Connections - 1994	524	715
Irrigated Land / Connection (acres)	6.5	5.5
Agricultural Deliveries (acre-feet)	7,247	1,129

Source: California Department of Water Resources 1994, Dornbusch & Company 2000

Table 4.3-9 presents the 1994 cost-of-service rates published by the Bureau of Reclamation for each Shasta and Trinity Divisions agricultural contract water. The table also shows the total cost-of-service incurred by each district in that year based on their recorded CVP agricultural contract water deliveries. Both BVWD and CCCSD receive ability-to-pay relief on their CVP agricultural water. However, no downward adjustment was made to reflect the associated cost savings as actual records on the either district; payments to the Bureau of Reclamation were not available.

TABLE 4.3-9
CONTRACT MAXIMUM, AGRICULTURAL DELIVERIES AND ESTIMATED COST BASED ON COST OF SERVICE RATES (1994)

	Bella Vista	Clear Creek
CVP Contract Maximum (acre-feet)	22,000	15,300
1994 CVP Agricultural Deliveries (acre-feet)	6,826	3,289
1994 Cost-of-Service Rate ($ per acre-feet))	$11.78	$15,79
Total Estimated Cost ($)	$80,410	$51,933

Source: Bureau of Reclamation 2000a Bureau of Reclamation 1994b, Dornbusch & Company 2000

Regional Economy

Shasta County's largest industrial sector is in services. In 1991, the services sector accounted for about 25 percent of the County's employment base, climbing to almost 32 percent by 1995. Services continue to represent the fastest growing segment of the economy followed by trade. Agriculture accounts for less than 5 percent of the County's industrial output and employment (EDD 1999).

The estimated average annual unemployment rate for Shasta County in 1999 was 7.1 percent (EDD 1999). Though the unemployment rate has declined from double-digit levels in the early part of the decade, it continues to exceed the California State-wide average by several percentage points. In addition, Shasta County ranked 31st out of the state of California's 58 counties with respect to per-capita income in 1998 (BEA 1998).

Table 4.3-10 summarizes 1991 industrial output, employment and income by Place-of-Work for the County. Data from 1991 were used over more current information to be consistent with the temporal setting of the regional economic analysis presented in the PEIS for the CVPIA. California's Employment Development Department reported that the County's unemployment rate in 1991 was almost 11 percent (EDD 1999).

TABLE 4.3-10
ESTIMATED OUTPUT, EMPLOYMENT AND INCOME BY PLACE-OF-WORK SHASTA COUNTY (1991)

Industrial Sector	Industrial Output	Employment	Income POW
	($Million)	*(Full-Time Jobs)*	*($Million)*
Agriculture	$130.53	2,332	$60.98
Mining	$497.41	272	$419.96
Construction	$604.27	6,746	$200.61
Manufacturing	$684.34	5,270	$258.52
Transportation	$478.03	4,115	$246.68
Trade	$583.20	16,581	$334.48
FIRE	$594.88	6,100	$373.84
Services	$808.69	18,751	$469.00
Government	$360.44	11,404	$331.23
	$4,741.79	71,571	$2,695.30

Source: Minnesota Implan Group 1994; Dornbusch & Company 2000

4.3.2 METHODOLOGY OF SOCIOECONOMIC AND LAND USE IMPACT ANALYSIS

The estimated socio-economic and land use impacts of the contract renewal alternatives are presented in ranges. These ranges extend from the baseline socio-economic and land use conditions under the No Action Alternative to the potential maximum socio-economic and land use impacts anticipated under Alternative 2 when compared to the No Action Alternative. In this manner, the evaluation provides bookends with which to consider the potential implications of alternative contract renewal options. Alternative 1 is ostensibly identical to the No Action Alternative framework with respect to those elements, particularly, water rate setting that may impact the socio-economies and land use within Shasta County. All of the impacts of Alternative 2 are presented in

terms of the incremental change relative to projected No Action conditions. The analysis is conducted for the year 2026, however dollars are reported in 1999, 1994 and 1991 terms depending on the availability of information, the time-frame of the analysis and to maintain consistency with the CVPIA EIS. It also should be noted that to maintain consistency with the CVPIA PEIS, BVWD's and CCCSD's projected future CVP M&I and agricultural water use is based on agricultural and M&I land use and development projections reported in the Shasta County General Plan. As such, the M&I and agricultural water and land use projections presented in this EA may differ from projections indicated by other planning documents, including the future water needs assessments submitted to the Bureau of Reclamation by the districts as part of the contract renewal process.

Methodology

The analysis of potential impacts on M&I and agricultural land use; M&I and agricultural water cost and agricultural economics of Shasta and Trinity Divisions long-term contract renewals is conducted at the level of the specific CVP contractors that would be affected. However, the analysis of potential regional economic and demographic impacts of contract renewal is conducted at a broader regional level. For the analysis, this region or affected region is defined as Shasta County. While the secondary economic and demographic effects of the alternative CVP contract renewal proposals may extend outside of Shasta County, it is reasonable to anticipate that the majority of those impacts will occur within the County. Ultimately, it is the localized effects of contract renewal that is most relevant to local community contract alternative evaluation.

Demographic Impacts

The evaluation of the potential demographic impacts of long-term CVP contract renewal for CVP contractors in the Shasta and Trinity Divisions focuses on population. The analysis starts with an assessment of contract-renewal-associated regional affects on employment (discussed below) since employment is a primary determinant of population dynamics. However, anticipated regional change in job availability is not the only factor that must be examined in assessing population effects of an action such as CVP contract renewal. The projected population impact of employment changes must be evaluated in the context of general labor market conditions and family size within the relevant area of study. Accordingly, both of these variables are duly considered in the evaluation of the potential population impacts of contract renewal. California Department of Finance population projections for Shasta County were used as the basis for estimating population conditions under the No Action Alternative.

Municipal and Industrial Water

The assessment of the potential incremental M&I water cost impacts of Alternatives 1 and 2 relative to the No Action Alternative are based on M&I water demand models developed for the CVPIA PEIS. A detailed description of those models is presented in the Municipal Water Costs Technical Appendix for the PEIS (PEIS 1997). In summary, the PEIS M&I models are designed to estimate the potential impact on the cost of CVP M&I water due to anticipated CVPIA-associated changes in CVP water rates and water deliveries. Thus, the M&I water cost impacts presented in the PEIS derive from the proposed introduction of 80-10-10 tiered pricing, a flat restoration charge applied to

each acre-foot of delivered water and the anticipated cost incurred by individual CVP contractors to acquire alternative water supplies and implement conservation measures to mitigate water delivery reductions due to CVPIA-mandated in-stream and refuge flow set-asides.

The primary source of data used to model water demands, local supplies and costs in evaluating contract renewal socio-economic and land use impacts were obtained from the California Department of Water Resources Bulletin 160-93. While Bulletin 160-93 has been updated in Bulletin 160-98, Bulletin 160-93 was used to be consistent with the CVPIA PEIS analysis assumptions (CDWR 1993). Estimates of future CVP deliveries with and without CVPIA were derived using the PROSIM and SANJASM models (see PEIS, technical appendices for a description of these hydrologic modeling tools).

The CVPIA PEIS water cost impact analysis results were aggregated into four regions. The Shasta and Trinity Divisions were included in the Sacramento Valley region.

An implicit assumption of the PEIS M&I cost impact analysis was that both residential and commercial/industrial water users are extremely price inelastic within a fairly large range of prices for water (i.e., they will effectively not change their use of water in response to even fairly substantial changes in the price of water). Certainly, price does influence the choice of water supply. However, in the case of Shasta and Trinity Division long-term renewal, the PEIS analysis concluded that non-CVP alternative reliable water supplies would cost well in excess of the effective CVP M&I water rates for any of the contract renewal proposals under consideration. Accordingly, no incremental change in future M&I demand for CVP water is anticipated under either Alternatives 1 or 2 when compared to the No Action Alternative.

Consistent with the CVPIA PEIS, the Shasta and Trinity Divisions contract renewal socio-economic impact analysis focuses on both the long-run average and short-run drought hydrologic conditions, and associated CVP deliveries. Projected post-CVPIA CVP M&I deliveries were obtained from the PEIS M&I models prepared by Reclamation.

The M&I cost analysis of the Preferred Alternative from the CVPIA PEIS (or No Action Alternative in this EA) was conducted assuming 80-10-10 tiered pricing and 1994 CVP M&I rates. Alternative 1 does not alter the rate-setting scheme stipulated in the No Action Alternative and therefore, would not have a real incremental impact on Shasta and Trinity Divsions CVP M&I water costs relative to the No Action Alternative. Alternative 2, however, would impact Shasta and Trinity Division contractors CVP M&I water costs.

The M&I cost impact analysis of Alternative 2 was conducted assuming the adoption of 80-10-10 tiered pricing, Category 1/ Category 2 water designation and the 1999 Shasta and Trinity contractors' CVP M&I rates adjusted to reflect the Alternative 2 proposed revision to the CVP rate-setting methodology.

The projected year 2026 M&I water cost impacts of Alternative 2 are presented in 1999 dollar terms as the increment above each potentially affected long-term renewal contractor's estimated cost of

CVP M&I water under the No Action Alternative for both the long-run average and short-run dry hydrologic condition.

CVP M&I water rates under Alternatives 1 and 2 are not expected to have any impact on Shasta and Trinity Division CVP M&I water demand. In addition, the two alternatives do not differ from the No Action Alternative with respect to projected CVP water supply/reliability. Therefore, it is not anticipated there will be any M&I water-related demographic or land use impacts of the contract renewal options. Accordingly, demographic and land use impacts are not addressed in the contract renewal M&I impact analysis. The analysis only examines Shasta and Trinity Divisions water-cost-related impacts. As in the CVPIA PEIS, it is assumed that any projected change in the cost of CVP water would be passed directly on to each district's customers, dollar for dollar.

Agricultural Water Cost, Land Use and Economic Impacts

The assessment of the demographic and agricultural water cost, land use and economic impacts under Alternatives 1 and 2 were based on the agricultural economic impact assessment models developed for the CVPIA PEIS (PEIS 1997). A detailed description of those models is presented in the Agricultural Economics and Land Use Technical Appendix in the PEIS. In summary, the PEIS agricultural economic and land use models were designed to estimate the potential direct impact of CVPIA-associated changes on agricultural water rates and supply/reliability on agricultural users, including land use, water use, gross value of crop production and farmer net revenue from irrigation.

Agricultural economic and land use impacts identified in the PEIS resulted from the introduction of 80-10-10 tiered pricing, the addition of a restoration charge on each acre-foot of delivered water and the projected cost of individual CVP contractors to acquire alternative water supplies to mitigate water delivery reductions due to CVPIA-mandated in-stream and refuge flows not offset through conservation. The PEIS agricultural economic impacts were derived applying the Central Valley Production Model (CVPM). The CVPM is a highly sophisticated tool that predicts farmer response to changes in the price and availability of resource inputs, particularly water. The types of response mechanisms built into the model include land fallowing, crop switching, changes in ground water pumping, etc. These responses ultimately have implications for the total value of crop production, land and water use and the net revenues to farmers subsequent to an event such as CVPIA implementation or contract renewal.

The CVPM model, as formatted for the PEIS, produces output for each of 22 separate sub-regions within the California Central Valley (for reporting purposes in the PEIS, these sub-regions were aggregated into four larger regions). The two CVP water contractors in the Shasta and Trinity Divisions that receive CVP agricultural water potentially impacted by long-term contract renewal, BVWD and CCCSD, are located in CVPM Region 1. Accordingly, the output of the CVPM model runs for region 1 were used to estimate the implications of the No Action alternative and Alternatives 1 and 2 for the agricultural lands and economy within BVWD and CCCSD. Estimates of gross value of farm production derived from CVPM were combined with recent cropping-pattern information for Bella Vista and Clear Creek to calculate district-specific estimates of gross value of production and farmer net revenue under the alternative contract renewal proposals.

The No Action Alternative and Alternative 2 would increase the CVP agricultural acreage limitation from two to five acres. If implemented, this contract stipulation would not necessarily affect the delivery and cost of CVP water for agricultural irrigators on parcels less than five acres. According to the Bureau of Reclamation, it would simply place a greater burden of proof on those irrigators and their districts to demonstrate that the agricultural water they are receiving (at agricultural water rates) is being put to legitimate agricultural uses. Bureau of Reclamation representatives believe that the change in acreage limitation would ultimately have little or no effect on the cost of water for farmers with parcels between two and five acres within the Shasta and Trinity Divisions. It will, however, place an additional administrative burden on farmers and their districts in managing CVP deliveries (Holt 2000).

4.3.3 ENVIRONMENTAL CONSEQUENCES

Demographics

No Action Alternative

Table 4.3-11 presents the projected year 2026 population for Shasta County. A comparison to Table 4.3-1 indicates that population is forecast to increase by about 50 percent from levels in 1999.

TABLE 4.3-11
AFFECTED REGION

Year	Total	White	Hispanic	Asian and Pacific	Black	American Indian
2026	254,466	216,653	17,960	10,743	2,261	6,849

Source: CDOF, 1998, Dornbusch & Company 2000

Alternative 1

Alternative 1 is assumed to have similar effects on demographics within the affected region as the No Action Alternative. Therefore, there are no environmental impacts of this alternative.

Alternative 2

It is anticipated that in implementation of Alternative 2 could result in a loss of or failure to create as many as 46 jobs within Shasta County in the year 2026. Given historically high unemployment within the County and adjacent region, it is not anticipated that the workers who would be displaced could readily find alternative employment. Accordingly, the loss of employment under Alternative 2 could result in a long-run decline of the Shasta County population of at most about 100 people or approximately 0.03 percent when compared to projected population levels under the No Action Alternative.

Municipal and Industrial Water Costs, Land Use and Economics

No Action Alternative

Table 4.3-12 presents the 1994 actual cost of service and estimated mid-tier and full-cost CVP M&I water rates for the Shasta and Trinity CVP contractors that would be affected by contract renewal.

The 1994 rates are presented as these are the rates applied in the most current evaluation of M&I water cost impacts available.

TABLE 4.3-12
ESTIMATED 1994 M&I WATER RATES UNDER 80-10-10 TIERED PRICING SHASTA AND TRINITY CONTRACTORS

	Cost-of-Service Rate 1st	Midpoint[1,2]	Full-Cost Rate[1]
CVP Contractor	***1st Tier (80 %)***	***2nd Tier (10 %)***	***3rd Tier (10 %)***
Bella Vista	$39.00	$44.99	$50.00
Clear Creek	$26.09	$32.81	$39.53
City of Redding[3]	$9.00-$11.40	$9.00-$13.24	$9.00-$15.08
Shasta County WA	$19.44	$23.02	$26.60
Mountain Gate	$9.00	$9.45	$9.90
Keswick County SA	$13.17	$15.73	$18.28
Shasta CSD	$10.77	$12.62	$14.47
City of Shasta Lake	$13.82	$13.82	$13.82
U.S.F.S.	$20.00	$20.00	$20.00

Source: Bureau of Reclamation 1994a, Dornbusch & Company 2000
1 In 1994 the Bureau did not publish the full-cost rate for M&I water. Accordingly, these rates were estimated based on the ratio of the cost-of-service and full-cost rates for each CVP long-term renewal contractor in 1997, the first year full-cost M&I rates were published.
2 Mid-Point estimated as the simple average of the cost-of-service and full-cost rates.
3 City of Redding pays a range of prices on its CVP M&I water since the water is delivered through different facilities.

Table 4.3-13 presents the projected year 2026 No Action Alternative deliveries and cost of Division CVP M&I water under both average and dry hydrologic conditions for each Shasta and Trinity CVP contractor that would be affected by contract renewal. The table indicates that the contractors would pay a total of approximately $1.1 million in the year 2026 for the untreated CVP M&I water of which they are projected to take delivery in a year of average hydrologic conditions per the CVP contracts undergoing the renewal process (1999 dollar terms).

TABLE 4.3-13
YEAR 2026 - PROJECTED CVP M&I DELIVERIES AND WATER COST - NO ACTION ALTERNATIVE (1994 DOLLAR TERMS)

CVP Contractor	CVP Contract Maximum (acre-feet)	Projected CVP M&I Deliveries Condition Average	Projected Cost of CVP M&I Water Average Condition ($000s)[1]	Projected CVP M&I Deliveries Dry Condition (000s of acre-feet)	Projected Cost of CVP M&I Water Dry Condition ($000s)[1]
Bella Vista WD	23.00	6.40	337.94	4.45	234.82
Clear Creek CSD	15.30	9.42	$377.72	6.54	$262.46
City of Redding	6.14	5.61	130.84	3.90	90.91
Shasta County WA	5.00	4.57	148.65	3.18	103.29
Mountain Gate	0.35	0.32	6.76	0.22	4.70
Keswick County SA	0.50	0.46	11.86	0.32	8.24
Shasta CSD	1.00	0.91	21.33	0.64	14.82
City of Shasta Lake	2.75	2.51	64.92	1.75	45.11
U.S.F.S.	0.01	0.01	0.29	0.01	0.20
Total	33.10	30.22	$1,100.30	21.00	$764.56

Source: CH2M Hill 1999, Dornbusch & Company 2000
1 Consistent with CVPIA PEIS analysis, figures are based on 1994 M&I rates and include restoration charge of $12.00 per acre-feet.

Alternative 1

Alternative 1 is assumed to have similar effects on M&I water costs for the affected water districts as the No Action Alternative. Therefore, there are no environmental impacts of this alternative.

Alternative 2

Table 4.3-12 presents the 1999- tiered rates for CVP M&I water by Shasta and Trinity Division contractors would have had the 1999 published rates been revised based on the rate-setting methodology proposed under Alternative 2. For the purpose of comparison, the table also shows the actual published 1999 M&I cost-of-service rate for each district. The table reveals a potentially large escalation of CVP M&I rates under Alternative 2. For example, the table shows that CCCSD's cost-of-service rate in 1999 would have been over three times higher than under the No Action Alternative ($137.59 per acre-foot compared to $42.01 per acre foot). The differences are not as large for the other districts ranging from nothing in the case of some of City of Redding's CVP supply to almost 50 percent for Keswick County Service Area. It should be noted that these rate comparisons account for the potential additional impacts on rates of the category 1/category 2 rate-setting measure also stipulated under Alternative 2 that would not be implemented under the No Action Alternative.

TABLE 4.3-14
1999 PUBLISHED COST-OF-SERVICE M&I RATES AND REVISED 1999 M&I WATER RATES ASSUMING 80-10-10 TIERED PRICING - SHASTA AND TRINITY DIVISIONS CONTRACTORS

Water District	No Action Alterative 1999 CVP M&I Rates	Alternative 2 Revised 1999 CVP M&I Rates		
	Cost-of-Service Rate	Cost-of-Service Rate ($acre-feet)	Midpoint[1] ($acre-feet)	Full-Cost Rate ($acre-feet)
CVP Contractor	1st Tier (80%)	1st Tier (80%)	2nd Tier (10%)	3rd Tier (10%)
Bella Vista WD	$57.62	$74.37	$85.13	$95.89
Clear Creek SCS	$42.01	$137.59	$165.41	$193.22
City of Redding[2]	$15.00-$21.77	$15.00-$23.41	$15.00-$27.25	$15.00-$31.08
Shasta County WA	$29.77	$37.78	$43.22	$48.66
Mountain Gate	$17.38	$17.72	$19.88	$22.03
Keswick County SA	$23.60	$35.09	$41.90	$48.71
Shasta CSD	$20.37	$24.57	$28.90	$33.23
City of Shasta Lake	$15.00	$15.00	$15.00	$15.00
U.S.F.S.	$15.00	$16.30	$17.84	$19.37

Source: Bureau of Reclamation 1999a, Dornbusch & Company 2000
1. Mid-Point estimated as the simple average of the cost-of-service and full-cost rates.
2. City of Redding pays a range of prices on its CVP M&I water since the water is delivered through different facilities.

Table 4.3-15 presents the estimated maximum year 2026 incremental impact of Alternative 2 on the cost of M&I contract water for each of the potentially affected Shasta and Trinity CVP M&I contractors assuming deliveries under average and dry hydrologic conditions. The table indicates that the total annual cost of untreated CVP M&I water within the Shasta and Trinity Divisions under average hydrologic conditions could increase by as much as $1.8 million dollars over the baseline cost of that water under the No Action alternative (in 1999 dollars). The table also reveals that CCCSD would experience the greatest M&I water cost impact among the potentially affected districts at a maximum, a three-fold increase in its cost of CVP M&I contract water under average conditions when compared to the No Action Alternative. The anticipated water cost increases presented in the table would be passed directly onto individual customers of the affected districts. However, the percentage increases in residential water bills would be much smaller than the percentage increase in the contractors' cost of untreated CVP water since the cost of treated water is only a small part of an individual's total residential M&I water bill. Nonetheless, any increase in residential water rates could have a particularly severe impact on individuals and families with limited income and ability-to-pay more for their water.

TABLE 4.3-15
YEAR 2026 IMPACTS ON CVP UNTREATED M&I WATER COST
AVERAGE AND DRY HYDROLOGIC CONDITIONS

		Alternative 2 Incremental Change From No Action Alternative		Alternative 2 Incremental Change From No Action Alternative
Contractor	**No Action Alternative - Average Condition ($000s)[1]**	**Maximum Impact - Average Condition ($000s)[2]**	**No Action Alternative - Dry Condition ($000s)[1]**	**Maximum Impact - Dry Condition ($000s)[2]**
Bella Vista	$337.94	$280.87	$234.82	$170.34
Clear Creek	$377.72	$1,259.72	$262.46	$780.91
City of Redding	$130.84	$88.14	$90.91	$53.85
Shasta County WA	$148.65	$106.16	$103.29	$64.80
Mountain Gate	$6.76	$3.79	$4.70	$2.39
Keswick County SA	$11.86	$12.91	$8.24	$7.85
Shasta CSD	$21.33	$16.72	$14.82	$10.19
City of Shasta Lake	$64.92	$6.74	$45.11	$4.68
U.S.F.S.	$0.29	$(0.01)	$0.20	$(0.01)
Total	$1,100.30	$1,769.17	$764.56	$1,095.00

Source: CH2M Hill 1999, Bureau of Reclamation 1999a and Dornbusch & Company
1 Based on 1994 published rates and $12 dollar restoration charge since the most currently available analysis of M&I water cost impacts is based on 1994 rates.
2 Based on 1999 revised rates and a $13.50 dollar restoration char6ge.

Agricultural Water Costs, Land Use and Economics

No Action Alternative

Table 4.3-16 presents the 1999 published cost of service and full-cost agricultural water rates for BVWD and CCCSD. The table reveals a greater disparity in Bella Vista's cost-of-service rate and full-cost rate than CCCSD. Unlike the assessment of CVP M&I water cost impacts of contract renewal, the No Action Alternative CVP agricultural water cost assessment is based on 1999 rates since the PEIS agricultural economic analysis was updated to 1999.

TABLE 4.3-16
ESTIMATED 1999 AGRICULTURAL WATER RATES UNDER 80-10-10 TIERED PRICING SHASTA AND TRINITY CONTRACTORS

	Cost-of-Service Rate	Midpoint	Full-Cost Rate
CVP Contractor	***1st Tier (80%)***	***2nd Tier (10%)***	***3RD Tier (10%)***
Bella Vista WD	$22.89	$38.105	$53.32
Clear Creek CSD	$18.21	$25.21	$32.2

Source: Bureau of Reclamation 1999b and Dornbusch & Company 2000

Table 4.3-17 presents the anticipated year 2026 Gross Value of Production, CVP agricultural water use and irrigated land in the BVWD and CCCSD service areas under the No Action Alternative. The table reveals that BVWD irrigators are projected to use over twice as much CVP water as Clear Creek irrigators on only about 25 percent more land. This disparity in water use can be explained by the fact that a greater proportion of Bella Vista's cropping pattern is projected to be in pasture, a water intensive crop.

TABLE 4.3-17
GROSS VALUE OF PRODUCTION, CVP AGRICULTURAL WATER USE AND IRRIGATED LANDS
NO ACTION ALTERNATIVE
BELLA VISTA WATER DISTRICT AND CLEAR CREEK COMMUNITY SERVICES DISTRICT

	BVWD		Clear Creek CSD	
Based on 1999 Dollars	**No Action Alterantive (Average)**	**No Action Alterantive (Dry)**	**No Action Alternative (Average)**	**No Action Alternative (Dry)**
Gross Value of Production ($Milliions)	$1.95	$1.95	$4.58	$4.58
CVP Water Use (in 1,000-acre-feet)	13.50	14.69[1]	5.80	6.31[1]
Irrigated Lands (in 1,000-acres)	5.96	5.89	4.69	4.64

Source: CH2M Hill 2000, Dornbusch & Company 2000
1 CVP water use increases in a dry year relative to an average year to offset anticipated reduction in ground-water pumping in dry years.

Alternative 1

Alternative 1 is assumed to have similar effects on agricultural water costs and associated land and water use, gross value of production, and farm net revenues for the affected water districts as the No Action Alternative. Therefore, there are no incremental environmental impacts of this alternative.

Alternative 2

Table 4.3-18 presents the 1999- tiered rates for CVP agricultural water for BVWD and CCCSD had the 1999 published rates been revised based on the rate-setting methodology proposed under Alternative 2. For the purpose of comparison, the table also shows the actual published 1999 agricultural cost-of-service rate for each district (No Action). The table reveals that the impact of Alternative 2 on CCCSD CVP agricultural cost-of-service water rates (about 20 percent) would be much lower than the impact on its CVP M&I cost-of-service water rates previously discussed. At the same time, Alternative 2 would cause Bella Vista's CVP agricultural water cost-of-service rate to increase by about 45 percent from the No Action Alternative. It should be noted that these rate comparisons account for the potential additional impacts on rates of the category 1/category 2 rate-setting measure also stipulated under Alternative 2 that would not be implemented under the No Action Alternative.

TABLE 4.3-18
1999 PUBLISHED COST-OF-SERVICE AGRICULTURAL RATES AND REVISED 1999 AGRICULTURAL WATER RATES ASSUMING 80-10-10 TIERED PRICING SHASTA AND TRINITY DIVISIONS CONTRACTORS

	No Action Alternative	**Alternative 2**		
	1999 CVP Agricultural Water Rates	**Revised 1999 CVP Agricultural Water Rates**		
Water District	**Cost-of-Service ($/acre-feet)**	**Cost-of-Service Rate ($/acre-feet)**	**Midpoint[1] ($/acre-feet)**	**Full-Cost Rate ($/acre-feet)**
CVP Contractor	1st Tier (80 percent)	1st Tier (80 percent)	2nd Tier (10 percent)	3rd Tier (10 percent)
Bella Vista WD	$22.89	$32.02	$53.85	$75.67
Clear Creek CSD	$18.21	$21.68	$30.17	$38.66

Source: Bureau of Reclamation 1999b, Dornbusch & Company 2000
1 Mid-Point estimated as the simple average of the cost-of-service and full-cost rates.

Tables 4.3-19 and 4.3-20 present the potential maximum incremental water cost and land use impacts under Alternative 2 for BVWD and CCCSD, respectively. Table 4.3-19 indicates that implementation of Alternative 2 could cause as much as 800 acres of Bella Vista's projected year 2026 irrigated pastureland to be fallowed during a year of average hydrologic conditions (and even more under dry hydrologic conditions). The table also shows that in the year 2026 and assuming average hydrologic conditions, Bella Vista farmers may reduce their use of CVP agricultural water by as much as 7,550 acre-feet, or more than half their 13,500 acre-feet of projected use under the No Action Alternative. The fallowing of land, and reduction of applied water on lands that remain under irrigation due to Alternative 2 could reduce the annual gross value of agricultural production within the BVWD by approximately 6 percent (or $120,000 in 1999 dollars) and the net income realized by farmers by as much as $130,000 in 1999 dollars under average hydrologic conditions. In a dry year, the decline in gross production value and net revenue impacts could climb to $180,000 and $260,000, respectively (in 1999 dollars). The projected maximum agricultural land and water use, gross value of production and net revenue impacts for Clear Creek under Alternative 2 are presented in Table 4.3-20.

TABLE 4.3-19
PROJECTED YEAR 2026 AGRICULTURAL ECONOMIC AND LAND USE IMPACTS *BELLA VISTA WD*

		Alternative 2 Maximum Incremental Change From No Action Average Condition		Alternative 2 Maximum Incremental Change From No Action Dry Condition
Based on 1999 Dollars	**No Action (Average)**	**Average Hydrologic Condition**	**No Action Alternative (Dry)**	**Dry Hydrologic Condition**
Gross Value of Production ($Milliions)	$1.95	($0.12)	$1.95	($0.18)
Fallowed Land	($0.06)			($0.06)
Groundwater Pumping	0.00			(0.06)
Irrigation Cost	0.14			0.14
CVP Untreated Water Cost	(0.21)			(0.28)
Crop Prices	0.00			0.00
Net Revenue Impact	($0.13)			($0.26)
Projected Year 2020				
CVP Water Use (000s acre-feet)	13.50	(7.55)	14.69	(9.44)
Irrigated Land (000s acres)	5.96	(0.80)[2]	5.89	(1.16)[2]

Source: CH2M Hill 2000, Bureau of Reclamation 1996, Dornbusch & Company 2000
1 Increase in revenues associated with efficiency and production gains from adoption of improved irrigation technologies.
2 Projected to be almost entirely pasture

TABLE 4.3-20
PROJECTED YEAR 2026 AGRICULTURAL ECONOMIC AND LAND USE IMPACTS *CLEAR CREEK CSD*

		Alternative 2 Maximum Incremental Change From No Action Average Condition		Alternative 2 Maximum Incremental Change From No Action Dry Condition
Based on 1999 Dollars	**No Action (Average)**	**Average Hydrologic Condition**	**No Action Alternative (Dry)**	**Dry Hydrologic Condition**
Gross Value of Production ($Milliions)	$4.58	($0.08)	$4.58	($0.12)
Fallowed Land	($0.04)			($0.04)
Groundwater Pumping	0.00			(0.04)
Irrigation Cost	0.06			0.06
CVP Untreated Water Cost	(0.09)			(0.19)
Crop Prices	0.00			0.00
Net Revenue Impact	($0.07)			($0.14)
Projected Year 2020				
CVP Water Use (000s Acre-feet)	5.80	(3.25)	6.31	(4.06)
Irrigated Land (000s acres)	4.69	(0.51)[2]	4.64	(0.74)[2]

Source: CH2M Hill 2000, Bureau of Reclamation 1996, Dornbusch & Company 2000
1 Increase in revenues associated with efficiency and production gains from adoption of improved irrigation technologies.
2 Projected to be almost entirely pasture.

4.3.4 CUMULATIVE EFFECTS ON THE REGIONAL ECONOMY

Table 4.3-21 summarizes projected year 2026 industrial output, employment and Income by Place-of-Work for Shasta County under the No Action Alternative. Consistent with the PEIS, the figures are presented in 1991 dollar terms.

TABLE 4.3-21
ESTIMATED YEAR 2026 OUTPUT, EMPLOYMENT AND INCOME BY PLACE-OF-WORK SHASTA COUNTY
(1991 DOLLAR TERMS)

Industrial Sector	Output ($Millions)	Employment (FTE Jobs)	Income POW ($Millions)
Agriculture	$131.01	2,341	$61.21
Mining	497.41	272	419.96
Construction	604.27	6,746	200.61
Manufacturing	684.30	5,270	258.51
Transportation	478.04	4,115	246.69
Trade	583.29	16,584	334.53
Fire	594.89	6,100	373.84
Services	808.69	18,751	469.00
Government	360.44	11,404	331.23
Total	$4,742.35	71,579	$2,695.62

Source: Minnesota Implan Group 1994; Dornbusch & Company 2000.

Alternative 1

Alternative 1 is assumed to have similar effects on the output, employment and income in Shasta County as the No Action Alternative. Therefore, there are no environmental impacts of this alternative.

Alternative 2

Table 4.3-22 summarizes the year 2026 sector-specific and total anticipated maximum incremental impacts on industrial output within Shasta County under Alternative 2. These impacts would result from the escalation of CVP M&I water rates as well as increased CVP agricultural water rates and acreage limitations and the associated changes in land use and farmer net income and gross value of agricultural production. The table indicates that if Alternative 2 were implemented, the County's total industrial output could decrease by as much as $3.3 million in 1991 dollars when compared to baseline No Action levels (less than 0.1 percent). The table also shows that the impacts on the County's agricultural sector would be larger, at approximately -0.2 percent.

TABLE 4.3-22
YEAR 2026 -- SHASTA COUNTY OUTPUT IMPACTS - ALTERNATIVE 2 (1991 COMPARATIVE BASIS)

		Alternative 2	
Industrial Sector	**No Action** **Average Condition ($Millions)**	**Incremental Change From No Action** **Maximum ($Millions)**	**Incremental Change From No Action Maximum**
Agriculture	$131.01	-0.28	-0.21%
Mining	497.41	-0.04	-0.01%
Construction	604.27	-0.04	-0.01%
Manufacturing	684.30	-0.59	-0.09%
Transportation	478.04	-0.30	-0.06%
Trade	583.29	-0.53	-0.09%
Finance, Insurance & Real Estate	594.89	-0.62	-0.10%
Services	808.69	-0.81	-0.10%
Government	360.44	-0.10	-0.03%
Total	$4,742.35	-3.31	-0.07%

Sources: Minnesota Implan Group 1994; Dornbusch & Company 2000.

Table 4.3-23 summarizes the year 2026 sector-specific and total anticipated maximum incremental impacts on employment within Shasta County under Alternative 2. The table indicates that the County's agricultural employment could decrease by about 5 jobs or 0.2 percent from baseline No Action levels under Alternative 2. Overall the County economy might see a decline of as much as 46 jobs if the Alternative were implemented.

Table 4.3-23
YEAR 2026 - SHASTA COUNTY EMPLOYMENT IMPACTS - ALTERNATIVE 2 (1991 COMPARATIVE BASIS)

		Alternative 2	
Industrial Sector	**No Action Average Condition (FTE Jobs)**	**Incremental Change From No Action Maximum (FTE Jobs)**	**Incremental Change From No Action Maximum (%)**
Agriculture	2,341	-5.3	-0.23%
Mining	272	0.0	0.00%
Construction	6,746	-0.6	-0.01%
Manufacturing	5,270	-2.4	-0.05%
Transportation	4,115	-2.1	-0.05%
Trade	16,584	-11.9	-0.07%
Finance, Insurance & Real Estate	6,100	-5.4	-0.09%
Services	18,751	-17.9	-0.10%
Government	11,404	-0.7	-0.01%
Total	71,579	-46.3	-0.06%

Source: Minnesota Implan Group 1994; Dornbusch & Company 2000.

Table 4.3-24 summarizes the year 2026 sector-specific and total anticipated maximum incremental impacts on income by place-of-work within Shasta County under Alternative 2. The table indicates

that the region's income by place-of-work could decrease by almost $1.9 million or 0.7 percent from baseline No Action levels under Alternative 2 (in 1991 dollar terms).

TABLE 4.3-24
YEAR 2026 - SHASTA COUNTY INCOME BY PLACE-OF-WORK IMPACTS FOR ALTERNATIVE 2
(1991 COMPARATIVE BASIS)

		Alternative 2	
Industrial Sector	**No Action Average Condition ($Millions)**	**Incremental Change From No Action Maximum ($Millions)**	**Incremental Change From No Action Maximum (%)**
Agriculture	$61.21	-$0.19	-0.31%
Mining	419.96	-0.03	-0.01%
Construction	200.61	-0.01	0.00%
Manufacturing	258.51	-0.22	-0.09%
Transportation	246.69	-0.15	-0.06%
Trade	334.53	-0.30	-0.09%
Finance, Insurance, and Real Estate	373.84	-0.39	-0.10%
Services	469.00	-0.47	-0.10%
Government	331.23	-0.09	-0.03%
Total	$2,695.62	-$1.87	-0.07%

Sources: Minnesota Implan Group 1994; Dornbusch & Company 2000.

Table 4.3-25 summarizes the anticipated land use, water cost and economic impacts of Alternative 1 for the Shasta and Trinity Division contractors. These impacts would have subsequent regional economic impacts within Shasta County as presented in Tables 4.3-21 through 4.3-24 above.

TABLE 4.3-25
SHASTA AND TRINITY DIVISIONS LAND USE, WATER COST AND
AGRICULTURAL ECONOMIC IMPACTS SUMMARY
AVERAGE HYDROLOGIC CONDITION

	Incremental Change From No-Action Conditions		
Impact Category	**No Action Alternative**	**Alternative 1**	**Alternative 2 Maximum Impact**
CVP M&I Water Cost ($000s)	$1,100	No Change	$1,769
Irrigated Land Use (000s acres)	10.65	No Change	-1.3
Gross Value of Production ($ Millions)	$6.53	No Change	-$0.2
Net Value of Production ($ Millions)	N/A	No Change	-$0.2
Annual CVP M&I Water Use Affected by Contract Renewal (000s acre-feet)	30.22	No Change	No Change
Annual CVP M&I Water Use Affected by Contract Renewal (000s acre-feet)	19.1	No Change	-10.8

Source: Dornbusch & Company 2000

4.4 LAND USE

4.4.1 AFFECTED ENVIRONMENT

This characterization of the affected environment for land use is based on information provided in:

- Shasta County Water Resources Master Plan Phase 1 Report - Current and Future Water Needs (October 1997). This analysis was prepared by the Shasta County Water Agency (SCWA) in partnership with CH2M HILL. The California Department of Water Resources (DWR) provided land use information (collected in 1995) that is basis for the acreages presented in this report. More than 90 percent of the Contractor service areas (i.e., boundaries of the Shasta and Trinity Divisions) are included within the 260,000-acre Redding Basin. Land use data are presented for the Redding Basin as a whole, but these data are not segregated by individual Contractors. Acreages reported for the Redding Basin include areas that are outside the Contractor service areas.

- City of Redding Draft Background Report (July 1998). This analysis was prepared by the City and various consultants, and contains land use information for the sphere of influence considered by the City in updating the General Plan.

- City of Redding Public Hearing Draft General Plan (March 2000), prepared by the City of Redding.

- Shasta County General Plan, as amended through October 1998, prepared by the Shasta County Department of Resource Management.

- City of Shasta Lake Existing Conditions Report (February 1999), prepared by the City of Shasta Lake.

- Bella Vista Water District Water Conservation Plan (January 1995), prepared by the BVWD. Supplemental information provided by the District in informal correspondence (November 1999 "Draft") also was incorporated.

- Clear Creek Community Services District Water Conservation Plan (November 1994), prepared by the CCCSD. Supplemental information provided by the District in informal correspondence (Water Conservation Plan Demand Analysis, Attachments 2 and B, dated March 19, 1999) also was incorporated. City of Shasta Lake Water Conservation Plan (March 1994), prepared by the City of Shasta Lake.

- City of Redding Water Conservation Plan (undated, assume 1994), prepared by the city of Redding.

Existing Land Uses

Existing land uses in Shasta County and the Redding Basin are shown in Table 4.4-1. As shown, Shasta County encompasses approximately 2.5 million acres. Approximately 6 percent of the county land base consists of water-using land. Approximately 2 percent of the total land base is urban/rural

urban (water- and non-water using combined). In the Redding Basin, where development is more concentrated, approximately 21 percent is water-using land, and 18 percent is urban/rural urban (water- and non-water using combined). The remaining lands are non-water use lands that are in native vegetation or "idle" status. The predominant agricultural water use in both Shasta County and in the Redding Basin is pasture irrigation. Non-water use areas are divided into three subcategories: native, idle, and rural urban non-irrigated (1 to 5 acres).

TABLE 4.4-1
SHASTA COUNTY AND REDDING BASIN LAND USES (ACRES)

Category	Shasta County	Redding Basin
Water-Using Lands - Irrigated Agriculture		
Permanent Crops		
Grain Field Crops	2,960	2,487
Pasture	5,308	1,572
Truck	48,998	16,187
Rice	989	337
Rural Urban (1 to 5 acres)	2,941	0
Total	2,672	2,672
	63,868	***23,255***
Urban		
Urban	26,945	18,224
Rural Urban Domestic (1to 5 acres)	5,375	4,632
Total	**32,320**	**22,856**
Commercial and Industrial		
Commercial	2,066	1,326
Industrial	3,556	2,844
Total	**5,622**	**4,170**
Recreation and Environmental		
Water Bodies	43,051	1,696
Parks and Golf Courses	714	490
Riparian Vegetation	5,467	2,799
Total	***49,232***	***4,985***
Total Water Use Areas	**151,042**	**55,266**
Non-Water Use Lands		
Native	2,277,486	178,836
Idle	11,031	1,886
Rural Urban Non-Irrigated (1 to 5 acres)	27,777	23,571
Total Non-Water Use Areas	**2,316,294**	**204,293**
Gross Land Use Area	**2,467,336**	**259,559**

Countywide, approximately 0.02 percent of the land base is used for commercial and industrial purposes, 2 percent is used for recreation and environmental purposes, and 3 percent is irrigated agriculture. The predominant water-using land use in Shasta County is agriculture. Ninety-three percent of the land base in Shasta County is classified as non-water use land.

The Redding Basin accounts for approximately 11 percent of the total Shasta County land base. About 2 percent of the land base is commercial and industrial, approximately 2 percent is used for recreation and environmental purposes, and nearly 9 percent is irrigated agriculture. Urban/rural

urban development is proportionately the most significant land use in the Redding Basin. Nearly 70 percent of the land base in the Redding Basin is non-water using land.

Urban development is concentrated in the south central portion of the county in the cities of Redding, Anderson, and Shasta Lake. Approximately 84 percent of the populous of Shasta County resides in these communities (Shasta County General Plan 1998). Of these areas, all receive Shasta-Trinity Project water supplies except Anderson. The City of Anderson is not affected by the scope of this project and will not be specifically addressed in future discussion.

TABLE 4.4-2
EXISTING LAND USE DESIGNATIONS
CITY OF REDDING AND CITY OF SHASTA LAKE (Acres)

Land Use Designation	City of Redding*	City of Shasta Lake
Residential	35,559	5,151
Retail	1,414	71
Service Commercial	1,143	NA
Highway Commercial	239	NA
Office	607	NA
Office Residential	168	NA
Commercial**	NA	340
Industrial	4,484	848
Airport Service	1,215	NA
Mineral Resources	NA	26
Park	1,342	128
Public Facility/Institution	1,895	178
Greenway	15,156	NA
Agriculture	631	NA
Federal Government	NA	201
TOTAL	**63,490**	**6,943**

Source: City of Redding Draft Background Report 1998; City of Shasta Lake General Plan Existing Conditions Report 1999
* Redding General Plan Area (not city limits)
** City of Shasta Lake does not differentiate commercial acreage use.

The BVWD encompasses 34,016 acres (53.2 square miles) with service provided to 4,776 connections. Of these connections, 534 receive water for agricultural use. Also of these 4,776 total connections, 4,608 are serviced by meters that are suited to typical residential lots (i.e., 3/4") or mid-sized acreage (i.e., 1-5 acres). There were 30 full time farms operating in 1997. Water for agricultural use is delivered to 6,151 acres of land. Of this total, 3,550 acres are irrigated (includes aquaculture). Most of the irrigated land is cropped to pasture (2,813 acres, 79 percent of total irrigated land). Grains, alfalfa hay and fruits account for 880 irrigated acres (25 percent of total irrigated land) (data inconsistency noted).

During the last 10 years in the BVWD, there has been a general trend toward lower crop production, and an increase in the acreage of irrigated pasture. The acreage planted in fruits and nuts has steadily

declined, while oat, alfalfa, and nut production has been variable. The cumulative total water consumption by residential, commercial, and rural users (defined by the BVWD to be users that irrigate in larger than residential quantities of water, but do not meet federal requirements for agricultural water use, typically the irrigated area being less than two acres) has increased, from 16 percent of the total 1988 consumption to 40 percent of the total 1997 consumption.

During the period from 1988 to 1993, M&I water consumption in the BVWD increased by approximately 130 percent, from 2,261 acre feet per year to 5,219 acre feet per year. Agricultural water consumption during the same time period decreased by almost 60 percent, from 11,628 acre feet per year, to 6,652 acre feet per year. In 1989 the number of M&I connections was 2,493, and in 1993 there were 3,684 connections. This represents a 43 percent increase between 1989 and 1993. This shift in cropping pattern and water consumption, away from agricultural uses and toward residential, commercial, and rural uses, is attributed to urbanization of the westerly portion of the BVWD, which is within the sphere of influence of the city of Redding.

The CCCSD encompasses 14,314 acres (22.4 square miles) with service provided to 2,498 connections. Of these connections, 788 receive water for agricultural use, and 1,551 are connections that provide water for M&I use . Water for agricultural irrigation (including aquaculture) is delivered to approximately 4,470 acres (data for 1989, provided March 19, 1999). Most of the irrigated land is cropped to pasture (2,161 acres, 48 percent of total agricultural irrigated land). Other irrigated crops (e.g., deciduous orchards, alfalfa, firewood/Christmas trees, miscellaneous field crops, etc.) account for 2,309 irrigated acres (52 percent of total agricultural irrigated land). About 2,640 acres of land that is capable of receiving water for agricultural use was not under a crop rotation (i.e., fallow) in 1989.

The City of Shasta Lake encompasses 7,024 (11 square miles) with service provided to 3,773 connections. All of the service connections are for M&I uses, and there are no agricultural land uses within the Contractor service area.

The City of Redding encompasses 59,044 acres with service provided to 24,889 connections. The City delivers water obtained under the CVP contract throughout the “Buckeye contract” service area, which includes about 4,237 connections. Most of these connections are within the City limits (included within the above-referenced 22,704 connections City-wide), but a few of the connections that receive water under the CVP contract are outside the City limits. All of the City of Redding deliveries of CVP water are for M&I uses, although the City General Plan designates 631 acres as Agriculture.

Additional historical land and water usage data specific to other Contractors were not available, except as previously described.

Projected Future Land Use

The cities of Redding and Shasta Lake, and Shasta County have each adopted General Plans to guide future development and land uses within their respective spheres of influence. As indicated in each of the plans, projected population growth trends are expected to continue at approximately 1.5 percent to 2.2 percent per year, based upon historic and predicted conditions.

The City of Redding projects a 21 percent increase in single and multiple family dwellings between the years 2000 and 2010. The number of acres required to support housing development during these years increases by 21 percent, from 902 acres at present to 1,092 acres in 2010. After 2010, growth and development is projected to decrease.

The acreage of agricultural land use within the CCCSD is projected to increase by 45 percent (from 7,110 acres to 10,325 acres) during the period 1989 through 2026 (Water Conservation Plan Demand Analysis, Attachments 2 and B, dated March 19, 1999). Acreages for all crops except miscellaneous field crops and nursery/lettuce are anticipated to increase. Anticipated increases range from 10 percent (alfalfa) to 300 percent (subtropical orchards). The acreage of irrigated pasture is anticipated to increase by 120 percent, from 2161 acres (1989) to 4,500 acres (2025). During this period the acreage of fallow land is projected to increase by 12 percent, from 2640 acres to 2950 acres.

Additional projections of future land and water usage specific to other Contractors were not available, except as previously described.

4.4.2 ENVIRONMENTAL CONSEQUENCES

No Action Alternative

Because renewal of the long-term contracts would not involve the construction of any physical facilities and structures, the No Action Alternative would not have a direct effect on land use. Additionally, implementation of the No Action Alternative would not conflict with any adopted land use plan. The No Action Alternative would not cause indirect effects on M&I land use.

Indirect effects on agricultural land use could occur under the No Action Alternative due to rewording to provide water service to parcels that are less than or equal to 5 acres as M&I water instead of irrigation water, unless the Contracting Officer is satisfied the use is irrigation. This effect would be limited to Contractors that are designated for CVP agricultural water use (i.e., BVWD and CCCSD). Assuming that the use is determined to be irrigation, this indirect effect is not anticipated to occur.

In 1996 a total of 7,319 acres of land within the two districts that are designated for CVP agricultural water use were irrigated with CVP water: 3,388 acres in the BVWD and 3,931 acres in the CCCSD. Under the No Action Alternative for the BVWD, the irrigated acreage is assumed to increase to 5,960 acres and 5,890 acres for the average and dry conditions, respectively. Under the

No Action Alternative for the CCCSD, the irrigated acreage is assumed to increase to 4,690 acres and 4,640 acres for the average and dry conditions, respectively. (See also Table 4.3-17.)

Alternative 1

Alternative 1 is assumed to have similar direct and indirect effects on land use as the No Action Alternative. There are no incremental environmental effects on land use under this alternative.

Alternative 2

Alternative 2 is assumed to have similar direct effects on land use as the No Action Alternative. There are no incremental direct environmental effects on land use under this alternative.

Regarding indirect effects, Alternative 2 may cause a slight retraction of the regional economy and consequent effect on M&I land use. A retraction of the regional economy would be expected to delay implementation or reduce the scale of land uses that rely on M&I water deliveries. Regional economic impacts may be small compared to the normal inter-year variation, so impacts on non-agricultural land uses may also be small. Otherwise, Alternative 2 is assumed to have similar indirect effects on M&I land use as the No Action Alternative. There are no other incremental indirect effects on M&I land use under this alternative.

Under Alternative 2, indirect effects on agricultural land use due to rewording to provide water service to parcels that are less than or equal to 5 acres as M&I water instead of as irrigation water are assumed to be similar to those anticipated under the No Action Alternative. There are no incremental indirect effects due to rewording under this alternative.

For Contractors that deliver agricultural water (i.e., BVWD and CCCSD), substantial fallowing of lands may occur with implementation of Alternative 2 relative to the No Action Alternative. Almost all of the additional fallowed lands are projected to be taken out of pasture. The incremental acreages that may be fallowed in 2026 under Alternative 2 versus the No Action Alternative are presented for the BVWD (average and dry conditions) in Table 4.3-19. These projections are presented for the CCCSD in Table 4.3-20.

As shown in Table 4.3-19, for the BVWD, implementation of Alternative 2 may result in increased fallowing (relative to the No Action Alternative) of about 800 acres in 2026 under average conditions; and may result in increased fallowing of about 1,160 acres under dry conditions. These values represent 13 percent and 20 percent reductions, respectively, in the irrigated acreages that are assumed to occur under the No Action Alternative in average and dry conditions.

As shown in Table 4.3-20, for the CCCSD, implementation of Alternative 2 may result in increased fallowing (relative to the No Action Alternative) of about 510 acres in 2026 under average conditions; and may result in increased fallowing of about 740 acres under dry conditions. These values represent 11 percent and 16 percent reductions, respectively, in the irrigated acreages that are assumed to occur under the No Action Alternative in average and dry conditions.

4.4.3 CUMULATIVE EFFECTS

Cumulative effects to land use would occur in the form of increased fallowing.

Almost all of the additional fallowed lands would be taken out of pasture. The incremental acreages that may be fallowed in 2026 under Alternative 2 versus the No Action Alternative are presented for the BVWD (about 1,160 acres may result in increased fallowing in 2026 under dry conditions) as presented in Table 4.3-19. For CCCSD, fallowing could occur on about 740 acres under dry conditions as shown in Table 4.3-20. Of the 38,998 acres of pasture in Shasta County, these fallowed areas represent less than 5 percent of pasture in Shasta County. Therefore, implementation of either Alternative 1 or 2 would result in minor changes to land use.

4.5 BIOLOGICAL RESOURCES

4.5.1 AFFECTED ENVIRONMENT

This characterization of the affected environment for biological resources is based on information provided in:

- California Native Plant Society Electronic Inventory of Rare and Endangered Vascular Plants of California. This comprehensive database maintained by the California Native Plant Society contains statewide sighting records of special-status plant species.

- Department of Fish and Game Natural Diversity Database (Rarefind) Version 2.1.2c. (March 2000). This state maintained database provides access to statewide special-status wildlife species sighting information.

- Department of Fish and Game list of Endangered and Threatened Animals of California. (July 2000). This comprehensive statewide list of special-status species was referenced to determine which species would potentially occur in Shasta County.

- City of Redding Draft Background Report (July 1998). This analysis was prepared by the City and various consultants, and contains information regarding existing habitat classifications, and special-status plant and wildlife species.

- City of Shasta Lake General Plan Existing Conditions Report (February 1999). This analysis prepared by Diaz Associates provided existing habitat classification, and special-status plant and animal background information.

- Bella Vista Water District Water Conservation Plan (January 1995), prepared by the BVWD. The plan was reviewed for special-status plant and wildlife information.

- City of Redding Water Conservation Plan (undated, assumed 1994), prepared by the City of Redding. The plan was reviewed for special-status plant and wildlife information.

- City of Shasta Lake Water Conservation Plan (March 1994), prepared by the City of Shasta Lake. The plan was reviewed for special-status plant and wildlife information.

- Clear Creek Community Services District Water Conservation Plan (November 1994), prepared by the CCCSD. The plan was reviewed for special-status plant and wildlife information.

Habitat Types and Communities Within the Shasta and Trinity Divisions

The Redding Basin is a hydrologic subbasin of the Sacramento River Basin, as defined by the Department of Water Resources (Shasta County Water Agency et al. 1997). More than 90 percent of the Study Area (i.e., boundaries of the Shasta and Trinity Divisions) is included within the 260,000-acre Redding Basin. The Redding Basin supports a diverse range of vegetation types and numerous wildlife species, and there are vegetation and wildlife resources that potentially may be affected by the project

The seven major habitat types or communities that occur within the Study Area are:

- Woodland (Valley Oak, Blue Oak, Blue Oak/Grey Pine)
- Annual Grasslands
- Mixed Chaparral
- Riparian
- Aquatic
- Vernal Pools/Wetland
- Irrigated Agriculture/Urban Vegetation/Pastureland

A description of each habitat type and associated wildlife species is provided in Table 4.5-1.

TABLE 4.5-1
HABITAT TYPES AND COMMUNITIES OCCURRING WITHIN THE SHASTA AND TRINITY DIVISIONS

Habitat Type	Characteristics
Woodland	The area supports a combination of woodlands including valley oak, (*Quercus lobata*), blue oak (*Q. douglasii*), and blue oak/grey pine (*Pinus sabiniana*). Woodland types transition as listed above from valley floor to low foothills. Tree densities vary across the landscape. Woodland habitat is structurally complex and diverse, and important to a variety of wildlife species, particularly grey squirrel (*Sciurus carolinensis*), mule deer (*Odocoileus hemionus*), bats, California quail (*Callipepla californica*),, and woodpeckers. Listed species associated with woodland habitat include American peregrine falcon, northern spotted owl, and Shasta salamander Shasta Salamander (*Hydromantes shastae*).
Annual Grassland	Annual grasslands are distributed throughout the area, often interspersed among oak woodlands. The seed crops produced in this habitat type are crucial for insects, birds, and grain-eating mammals, as well as those species that prey upon them. Predators include coyote (*Canis latrans*), grey fox (*Urocyon cinereoargenteus*), hawks, white-tailed kite (*Elanus caeruleus*), and owls. This habitat is capable of supporting burrowing owls (*Athene cunicularia*), and other denning mammals. This is a favored habitat for mule deer Listed species associated with annual grassland habitat include American peregrine falcon and Swainson's hawk.

TABLE 4.5-1
HABITAT TYPES AND COMMUNITIES OCCURRING WITHIN THE SHASTA AND TRINITY DIVISIONS

Habitat Type	Characteristics
Woodland	The area supports a combination of woodlands including valley oak, (*Quercus lobata*), blue oak (*Q. douglasii*), and blue oak/grey pine (*Pinus sabiniana*). Woodland types transition as listed above from valley floor to low foothills. Tree densities vary across the landscape. Woodland habitat is structurally complex and diverse, and important to a variety of wildlife species, particularly grey squirrel (*Sciurus carolinensis*), mule deer (*Odocoileus hemionus*), bats, California quail (*Callipepla californica*),, and woodpeckers. Listed species associated with woodland habitat include American peregrine falcon, northern spotted owl, and Shasta salamander Shasta Salamander (*Hydromantes shastae*).
Mixed Chaparral	These shrublands are typically found in the upland areas, often in dense thickets in steeper terrain. Locally dominant shrubs include manzanita (*Arctostaphylos* sp.), buckbrush (*Ceanothus* sp.), toyon (*Heteromeles arbutifolia*), redbud (*Cercis occidentalis*), and scrub oak (*Quercus berberidifolia*). This vegetative community provides suitable foraging, nesting, and cover habitat for a variety of mammals, birds, and reptiles. Mammal species include California vole (*Microtus californicus*), deer mouse (*Peromyscus maniculatus*), black-tailed jack rabbit (*Lepus californicus*), and coyote. Bird species include California quail, Bewick's wren (*Thryomanes bewickii*), and roadrunner (*Geococcyx californianus*). Reptiles include western fence lizard (*Sceloporus occidentalis*), and western rattlesnake (*Crotalus viridis*). Listed species associated with the habitat include the Shasta salamander and Red Mountain catchfly.
Valley Foothill Riparian	Riparian communities are found along watercourses in the area and are one of the most valuable habitats in California, providing food, cover, and nesting habitat, thermal refuge, and migration and dispersal corridors. Common associates include valley oak, California sycamore (*Platanus racemosa*), Fremont's cottonwood (*Populus fremontii*), willow (*Salix* sp.), and elderberry (*Sambucus* sp.). The area has significant stands of Sacramento river riparian vegetation providing habitat for approximately 250 species of wildlife. Statewide, only five percent of the historical acreage of river riparian vegetation remains. Mammals commonly found in riparian areas include ringtail (*Basariscus astutus*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), and grey fox. Birds species found in riparian areas commonly include, red-shouldered hawk (*Buteo lineatus*), wood duck (*Aix sponsa*), great blue heron (*Ardea herodias*), yellow warbler(*Dendroica petechia*), and black-crowned night heron (*Nycticorax nycticorax*). Amphibians such as Pacific tree frogs (*Pseudacris regilla*) and bullfrogs (*Rana catesbiana*) are commonly abundant. Reptiles include Pacific gopher snake (*Pituophis melanoleucus catenifer*), and garter snakes (*Thamnophis* sp.) Listed species associated with valley foothill riparian habitat include bald eagle, American peregrine falcon, western yellow-billed cuckoo, California red-legged frog, and valley elderberry longhorn beetle.
Aquatic	Aquatic communities include rivers, streams, lakes, and ponds. These communities provide important wildlife habitat for waterfowl, osprey (*Pandion haliaetus*), bald eagle, belted kingfisher (*Ceryle alcyon*), grebes, frogs, and northwestern pond turtles (*Clemmys marmorata marmorata*). Numerous species of insects reproduce and live in these communities, providing a significant prey base. Many predaceous birds and mammals forage in these communities, as well as use river and stream corridors as travelways, or for

TABLE 4.5-1
HABITAT TYPES AND COMMUNITIES OCCURRING WITHIN THE SHASTA AND TRINITY DIVISIONS

Habitat Type	Characteristics
Woodland	The area supports a combination of woodlands including valley oak, (*Quercus lobata*), blue oak (*Q. douglasii*), and blue oak/grey pine (*Pinus sabiniana*). Woodland types transition as listed above from valley floor to low foothills. Tree densities vary across the landscape. Woodland habitat is structurally complex and diverse, and important to a variety of wildlife species, particularly grey squirrel (*Sciurus carolinensis*), mule deer (*Odocoileus hemionus*), bats, California quail (*Callipepla californica*),, and woodpeckers. Listed species associated with woodland habitat include American peregrine falcon, northern spotted owl, and Shasta salamander Shasta Salamander (*Hydromantes shastae*).
Irrigated Agriculture / Urban Vegetation / Pasture	These irrigated habitats include row crops, orchards, landscape strips, parks, golf courses, and pasturelands. Wildlife species that frequent agricultural areas vary with crop type and season, but may include red-winged blackbird ((*Agelaius phoeniceus*), American crow (*Corvus brachyrhynchos*), black-tailed jack rabbit, California ground squirrel (*Spermophilus beecheyi*), burrowing owl, and various predators. Urban vegetation is frequented by more disturbance-tolerant species such as northern mockingbird (*Minus polyglottos*) American robin (*Turdus migratorius*), European starling (*Sturnus vulgaris*), California ground squirrel, Pacific tree frog, opossum ((*Didelphis virginiana*), and western toad (*Bufo boreas*). Pasturelands are usually a mix of perennial grasses and
Vernal Pool/Wetland	Vernal pools are seasonal wetlands found interspersed in grasslands and oak savannahs, most commonly in the southeast portion of the STWD water service area. They are small basins with an underlying impervious rock or clay layer that collect storm water, gradually drying later in the spring. These habitats support species such as the western spadefoot (*Scaphiopus hammondii*), and various frog species. Listed species associated with vernal pool habitat include Aleutian Canada goose, greater sandhill crane, vernal pool tadpole shrimp, vernal pool fairy shrimp, Greene's tuctoria, Slender Orcutt grass, Boggs Lake hedge-hyssop.

Source: City of Shasta Lake General Plan, Existing Conditions Report 1999
City of Redding Draft Background Report 1998

Special-Status Species

Special status species are defined in this EA to include federally and state-listed threatened or endangered species, species proposed for federal listing as threatened or endangered, and federal candidate species (PEIS 1997).

In response to consultation, the United States Fish and Wildlife Service (USFWS) prepared a list of Endangered and Threatened Species that May Occur in or Be Affected by Projects in Shasta County (USFWS 2000a; Reference file No. 00-SP-2414) (Appendix C). A total of 10 federal special-status wildlife and plant species and one critical habitat were identified.

Search results from the California Department of Fish and Game (CDFG) California Natural Diversity Database (CDFG 2000a), and the CDFG list of Endangered and Threatened Animals of

California (CDFG 2000b) resulted in the inclusion of eleven California special-status wildlife species that could potentially occur in Shasta County. Query results from the California Native Plant Society (CNPS) Electronic Inventory of Rare and Endangered Vascular Plants (Skinner and Pavlick 1994) resulted in the inclusion of four California special-status plant species that could potentially occur in Shasta County.

District water conservation plans have been prepared by the Bella Vista Water District (January 1995), Clear Creek Community Service District (November 1994), City of Redding (undated, assume 1994), and City of Shasta Lake (March 1994). The district water conservation plans were reviewed to ensure that listed plant and wildlife species identified by the districts were included in this analysis.

Appendix C lists the 20 state and federally listed species and one critical habitat that could potentially occur in Shasta County. The general habitat association for each species is also included. The following special-status designations are applicable to these species listed in Appendix C: Endangered (E), Threatened (T), and Rare (R). Some species may be both state and federally listed.

The following species would not require further consideration in this EA for the reasons specified below:

Northern spotted owl - in northern California, this species is closely associated with moist mixed conifer and Douglas fir habitat. There have been no observations of the northern spotted owl in the project study area.

Western yellow-billed cuckoo - the western yellow-billed cuckoo was historically common throughout the Central Valley and other lowland areas. It is now uncommon to rare in scattered locations throughout California (Zeiner and Laudenslayer et al. 1990). There are no recently reported observations of the western yellow-billed cuckoo in the project study area.

Willow flycatcher - the willow flycatcher is typically found in willow-dominated habitat and wet meadow areas above 2,000 feet in elevation. The project area is below the minimum elevational range for this species. There are no known observations of willow flycatcher in the project study area.

California red-legged frog - the historic range of the California red-legged frog extended into the Redding Basin, but the frog is believed to be locally extirpated. There have been no reported observations in the project area since 1925 (Jennings and Hayes 1994).

California wolverine – The California wolverine is found in mixed conifer and associated habitats, typically above 1,600 feet in elevation. This habitat type is not present in the project study area. There are no known observations of the California wolverine in the project study area.

Sierra Nevada Red Fox – The Sierra Nevada red fox is native to mid- to high-elevation mixed conifer habitats. Mixed conifer habitat is not present in the project study area. There are no known observations of Sierra Nevada red fox in the project study area.

Shasta crayfish - the Shasta Crayfish occurs only in streams in the Pit River, Fall River, and Hat Creek drainages. There are no known sightings of the Shasta crayfish in the project study area.

Red Mountain catchfly - there is presently only one localized Red Mountain catchfly population in the southwest corner of Shasta County. There are no records of this plant species in the project

Per CFDG literature, there are no identified deer migration corridors, fall holding areas, fawning grounds, or critical winter range within the study area (Shasta County DRM 1998). However, deer are known to use all of the habitats described above.

4.5.2 ENVIRONMENTAL CONSEQUENCES

No Action Alternative

Because renewal of the long-term contracts would not involve the construction of any physical facilities and structures, the No Action Alternative would not have a direct effect on biological resources. The No Action Alternative would not cause indirect effects on biological resources for parcels receiving M&I water.

Indirect effects on biological resources could occur under the No Action Alternative due to rewording to provide water service to parcels that are less than or equal to 5 acres as M&I water instead of as irrigation water, unless the Contracting Officer is satisfied the use is irrigation. This effect would be limited to Contractors that are designated for CVP agricultural water use (i.e., BVWD and CCCSD). Assuming that the use is determined to be irrigation, this indirect effect is not anticipated to occur.

In 1996 a total of 7,319 acres of land within the two districts that are designated for CVP agricultural water use were irrigated with CVP water: 3,388 acres in the BVWD and 3,931 acres in the CCCSD. Under the No Action Alternative for the BVWD, the irrigated acreage is assumed to increase to 5,960 acres and 5,890 acres for the average and dry conditions, respectively. Under the No Action Alternative for the CCCSD, the irrigated acreage is assumed to increase to 4,690 acres and 4,640 acres for the average and dry conditions, respectively. (See also Table 4.3-17.) This indirect effect may be beneficial and/or adverse for biological resources, depending on the specific parcels, habitats and species under consideration. Reclamation is consulting with fish and wildlife agencies (federal and state) regarding this indirect effect.

Alternative 1

Alternative 1 is assumed to have similar direct and indirect effects on biological resources as the No Action Alternative. There are no incremental environmental effects on land use under this alternative.

Alternative 2

Alternative 2 is assumed to have similar direct effects on biological resources as the No Action Alternative. There are no incremental direct environmental effects on land use under this alternative.

Regarding indirect effects, Alternative 2 may cause a slight retraction of the regional economy and consequent effect on M&I land use. A retraction of the regional economy would be expected to delay implementation or reduce the scale of land uses that rely on M&I water deliveries, which is assumed to be a beneficial effect on biological resources. Regional economic impacts may be small compared to the normal inter-year variation, so beneficial effects on biological resources are expected to be small. Otherwise, Alternative 2 is assumed to have similar indirect effects on biological resources occurring on lands receiving M&I water as the No Action Alternative. There are no other incremental indirect effects on biological resources occurring on lands receiving M&I water under this alternative.

Under Alternative 2, indirect effects on agricultural land use due to rewording to provide water service to parcels that are less than or equal to 5 acres as M&I water instead of as irrigation water are assumed to be similar to those anticipated under the No Action Alternative. There are no incremental indirect effects due to rewording under this alternative.

For Contractors that deliver agricultural water (i.e., BVWD and CCCSD), substantial fallowing of lands may occur with implementation of Alternative 2 relative to the No Action Alternative. Almost all of the additional fallowed lands are projected to be taken out of pasture. The incremental acreage that may be fallowed in 2026 under Alternative 2 versus the No Action Alternative are presented for the BVWD (average and dry conditions) in Table 4.3-19. These projections are presented for the CCCSD in Table 4.3-20.

As shown in Table 4.3-19, for the BVWD, implementation of Alternative 2 may result in increased fallowing (relative to the No Action Alternative) of about 800 acres in 2026 under average conditions; and may result in increased fallowing of about 1,160 acres under dry conditions. These values represent 13 percent and 20 percent reductions, respectively, in the irrigated acreages that are assumed to occur under the No Action Alternative in average and dry conditions.

As shown in Table 4.3-20, for the CCCSD, implementation of Alternative 2 may result in increased fallowing (relative to the No Action Alternative) of about 510 acres in 2026 under average conditions; and may result in increased fallowing of about 740 acres under dry conditions. These values represent 11 percent and 16 percent reductions, respectively, in the irrigated acreages that are assumed to occur under the No Action Alternative in average and dry conditions.

Increased fallowing may have variable indirect effects on biological resources. These indirect effects may be beneficial and/or adverse, depending on the specific parcels, habitats and species under consideration.

4.5.3 CUMULATIVE EFFECTS

Alternatives 1 and 2 will not result in any cumulative direct effects to biological resources because there would be no infrastructure changes or physical disturbances due to changes in water purchasing by a water contractor.

4.6 ENVIRONMENTAL JUSTICE

As mandated by Executive Order 12898, published February 11, 1994, entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," this document addresses potential environmental justice concerns. The specific requirements of the Executive Order require federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low income populations. In August 1994, the Secretary of the Interior issued an environmental justice policy statement directing departmental action resulting in Interior's *Strategic Plan for Environmental Justice.*

As part of Reclamation's decision making process, public involvement, Indian trust assets consultation, and coordination with potentially affected public, are considered. It is expected that renewal of the long-term water service contract between Reclamation and Shasta-Trinity water contractors would not disproportionately affect minority populations or low-income populations. Minority populations comprise about 10 percent of the population in Shasta County (California Department of Finance 2000). Additionally, renewal of the proposed contract terms and provisions would not involve the construction of new facilities, cause the relocation of any populations, result in any known health hazards, cause the generation of any hazardous wastes, result in any property takings, or generate any substantial economic impacts.

The proposed long-term water service contract renewal would not have an adverse human health or environmental effect as defined by environmental justice policies and directives. Rather, the provision of renewed long term water supply would continue to provide a projected water demand and need, which has previously been documented by the county general plan and cities' general plans.

4.7 INDIAN TRUST ASSETS

4.7.1 AFFECTED ENVIRONMENT

Indian trust assets are legal interests in property that are held in trust by the U.S. Government for Indian tribes or individuals. The Secretary of the interior is the trustee for the United States on behalf of recognized Indian tribes. Examples of Trust assets are: lands, minerals, hunting and fishing rights, and water rights.

Reclamation shares the responsibility to protect and maintain Indian Trust assets reserved by or granted to Indian Tribes, or Indian individuals by treaty, statute, or Executive Order. Reclamation carries out its activities in a manner that protects trust assets and avoids impacts, where possible. Where not possible, compensation or mitigation is provided in consultation with affected Tribes.

There are no known federally recognized Indian trust assets within the contract service areas of the Shasta and Trinity Divisions that would be affected other than the Redding Rancheria which receives water from the City of Redding (outside of the Buckeye zone).

4.7.2 ENVIRONMENTAL CONSEQUENCES

No Action Alternative

No Indian trust assets would be environmentally affected by the No Action Alternative.

Alternative 1

Indian Trust assets would not be environmentally affected by Alternative 1.

Alternative 2

Indian trust assets would not be environmentally affected by Alternative 2. Impacts to the Redding Rancheria would be the same as those experienced by residents of the City of Redding.

4.7.3 CUMULATIVE EFFECTS

Implementation of Alternative 1 or 2 would not affect Indian Trust assets, and would therefore not contribute cumulative impacts to those assets.

4.8 CULTURAL RESOURCES

This section describes the cultural resources for the area within which occur the nine long-term water service contractors in the Shasta and Trinity Divisions. The service area boundaries of the long term water service contractors fall within one of the following: the unincorporated land base of Shasta County, limits of the City of Redding, or limits of the City of Shasta Lake.

4.8.1 AFFECTED ENVIRONMENT

Prehistory

A paper presented by Elaine Sundahl (1992) provides the best existing overview of the prehistoric period within the study area. Although the field work completed and reported by Sundahl is more wide ranging, it serves as an accurate description of the prehistoric record within the study area.

The earliest defensible dated cultural evidence from the region adjoining the study area comes from an archaeological site, CA-SHA-475, on the Squaw Creek drainage of Shasta Lake. Radiocarbon dates from the lowest stratum indicates human use dating between 6,530 and 7,580 years ago (Sundahl, 1992:99). Material in this layer represent the Borax Lake Pattern as described by Fredrickson (1973). This cultural tradition is also described in general texts (Chartkoff & Chartkoff, 1984:109; Moratto, 1984: 82) as containing relatively large widestem points typically fashioned from Grasshopper Flat / Lost Iron Wells obsidian or local silicate materials and unshaped milling tools. This period lasting until about 5,000 years ago was likely typified by a foraging economy based on extensive hunting and the collection of native plants especially hard seeds. This pattern is thought to be linked to Hokan speaking people, quite possibly the ancestors of the Yana.

During the period between approximately 5,000 and 3,000 years ago the tool kit of aboriginal inhabitants changed. This later pattern is termed the Squaw Creek Pattern again based on Sundahl's work north of Shasta Lake. Contracting stem points, uniface points and leaf shaped points appear. These projectile points increasingly are made from Tuscan Source obsidian. Milling tools are evidenced by the addition of mortars and pestles. Hand stones (manos) used on mill stones (metates) are often extensively shaped in contrast to the earlier pattern. The use of mortars suggests an increased reliance on acorns and, perhaps, other softer foods. Evidence of this pattern is more widespread which could be a factor of preservation or increasing human use.

The period between approximately 3,000 and 1,700 years ago is termed the Whiskeytown Pattern by Sundahl. It is typified by "*...large and medium-sized corner-notched and side-notched points, manos, millingstones, and notched-pebble net weights*" (Sundahl, 1992: 103). Many sites in the Redding vicinity include clear evidence of this pattern. Although the foraging tradition of earlier patterns continued, an increased reliance on riverine resources is suggested by the location of the sites and the inclusion of the net weights.

The last period has long been described as the Shasta Complex (Meighan, 1955). However, Sundahl (1992: 104) follows Fredrickson by terming this well known period as the Augustine Pattern. During

the last 1,500 years or so, the aboriginal inhabitants diversified and specialized in the exploitation of natural resources. Smaller barbed projectile points and shaft smoothers mark the appearance and increased use of the bow and arrow. Specialization led to increased sedentism with relatively large seasonal encampments along the major streams and, especially, at their confluences within the study area. Bone fishing implements and the appearance of substantial quantities of shell and fish bone suggest a riverine based economy. This cultural pattern is related to the appearance of Penutian speaking people from the Columbia Plateau. These people are assumed to be the ancestors of the modern Wintu.

Ethnography

Prior to appearance of Euro-American explorers and settlers, the study area was populated by the Wintu and Yana. The Wintu occupied all of the study area except the Cow Creek drainage which fell on the northwestern edge of the Yana (Johnson, 1978:361). The Yana spoke a Hokan dialect (Shipley, 1978: 86) whereas the Wintu spoke a Penutian language (ibid: 82,83). These languages were from different linguistic families.

In addition to the vast language differences, the two peoples occupied somewhat different environments. The Wintu appear to have been spreading rapidly and controlled the Sacramento River corridor and many of it's most productive tributaries. The Yana were relegated to the eastern foothills and stream corridors of the southern Cascade.

The material culture and lifestyles of the two groups were, however, quite similar (DuBois, 1935: Johnson, 1978; LaPena, 1978; Sundahl, 1992:90). They both constructed semipermanent or permanent villages on the terraces above main stream corridors and emphasized the use of fish (especially salmon), shellfish, acorns and other native plant foods. These staples were processed to provide food during the winter and other lean periods. Reliance on a variety of foods lessened the possibility of famine due to the failure of supply of one or more food sources. Hunting augmented the staples of the diet (Sundahl, 1992:90). Skins acquired through the hunting or snaring of animals were processed and used for a variety of items especially clothing. Housing was comprised of conical, semi-subterranean family residences. These small structures (approximately 10' diameter) often were located near a larger communal structure which was used variously as a residence and for ceremonies (LaPena, 1978: 325,326; Johnson, 1978: 367). The size of these communal structures appear to have increased in size through time.

History

The history of the greater Redding area revolves around mining, ranching, farming, lumbering, transportation and tourism. The relative importance of these economic pursuits varied by place and time. However, they continue to play some role within the economy of the study area even today. Therefore, the following discussion is organized by time with a brief discussion of the relative importance of these or other significant activities as derived from Petersen (1965).

Although the renown trapper Jedediah Strong Smith is generally credited with the earliest (1828) Euro-American exploration through Shasta County, his party only crossed the far southwestern corner of the County well away from the study area. Other trappers crossed the area in hopes of claiming the furs and land for Britain or the United States. These forays were upsetting to the Mexican government who, although had no presence within the study area at this early period, claimed sovereignty. Alexander McLeod (1929), Peter Ogden (1830) and John Work (1832) all represented the interests of the Hudson Bay Company. Ewing Young was the first American (1832) known to actually cross the study area.

In response to these activities, the Mexican government pressed their sovereignty within the Sacramento Valley by providing land grants to Mexican citizens. Many of these citizens were American or European settlers. The most significant of these new land claimants within the study area was Pierson B. Reading who was granted the Buena Ventura 26,633 acre land grant in 1844. The grant stretched along the west side of the Sacramento River from Salt Creek in the north to Cottonwood Creek in the south. Although his permanent abode and successful farming operation were located between the lower reaches of Anderson and Cottonwood Creeks, his actions would have significant effects on developments within and adjoining the study area.

Reading played a major role in the Bear Flag Revolt of 1846 which paved the way for American claims to California and the Mexican - American War of 1846 - 1847. Subsequent to the Mexican cession of California to the United States of America, gold was discovered in 1848 at Sutter's Mill leading to the California gold rush. Pierson B. Reading was soon involved in this frenzy. He led parties to discover the second gold strike in California at Reading Bar on Clear Creek which adjoins the study area, Reading Bar on the Trinity River and Reading Springs (Old Shasta). These discoveries were the major impetus for the claiming, settlement and subsequent development of Shasta and Trinity Counties. Within the study area, placer mining and, eventually, hard rock mining fueled the economy. Although mining activities did not occur in the eastern portion of the study area, ranching and farming activities were undertaken as means support and profit from the mining communities. Mining flourished throughout the 1850s and 1860s with individual operations giving way to corporate undertakings.

In 1872 the Central Pacific Railroad reached the new settlement of Redding which was named after the railroad land agent B. B. Redding. Redding served as the railroad terminus until 1883 when the route was pushed northward along the Sacramento River canyon. The quick development of Redding led to the demise of Shasta which served as the County seat from 1851 until 1888. With local mining revenues gone, Shasta soon became a town "gone bust". Large hydraulic mining operations including those within the study area also ceased in compliance with State law in 1884.

Citizens of the study area increasingly depended on farming, ranching and the railroad as the underpinnings to the economy. Happy Valley was the only irrigated area in the early 1880s. Produce grown by this irrigation led to the Valley's settlement and development. Although other areas did not yet benefit from sizeable irrigation projects, extensive agriculture, livestock grazing, dairying and manufacturing continued to support a growing population.

In the latter part of the nineteenth and early part of the twentieth centuries, mining returned in vigor with the extraction and smelting of copper from a belt running from Keswick upstream along the Sacramento and Pit Rivers to Bully Hill outside of the study area. By the conclusion of World War I, this industry had dwindled. The smelting activities had laid ruin to a vast acreage of vegetation including fruit trees as far away as Happy Valley and Anderson. Local manufacturing, e.g. Terry Lumber Company in Bella Vista and gold dredging along Clear Creek, profited during this copper heyday. All of these undertakings were made possible due to the services of the railroad. The study area headed into an economic decline during the 1920s and 1930s after the bust of the copper industry. Redding even lost population during this period.

With the construction of Shasta Dam in the late 1930s and early 1940s, the economy and population began an upward trend. Lumber mills were built within and, especially, south of the City of Redding following World War II to support the land development of California. Sand and gravel mining supplanted ore extraction within the study area. The completion of State Highway 99 in the 1920s augmented the shipping and transportation services of the railroad. With the proliferation of the automobile, the area became a destination for tourism and recreation.

Identified Cultural Resources

Table 4.8-1 lists the cultural resources identified within or adjacent to the service area boundaries of the Shasta and Trinity Divisions.

TABLE 4.8-1
SHASTA AND TRINITY DIVISIONS CULTURAL RESOURCES[1]

Name	Location	Theme[2]
Bass Hill	North of Redding	EX/SE
Bells Bridge	Highway 99, Clear Creek	EX/SE
Benton Tract Site*	Redding	CULT
Briggsville	Clear Creek Road	EC/IN
California-Oregon Road	Anderson	EX/SE
Clear Creek	Redding	EC/IN
Cow Creek Petroglyphs	**	CULT
Horse Town	Clear Creek Road	EC/IN
Millville	Old 44 Drive	EC/IN
Old City Hall*	Redding	SO/ED
Olsen Petroglyphs	**	CULT
Pine Street School*	Redding	SO/ED
Pioneer Baby's Grave	West of Shasta	EX/SE
Ried Mine in Old Diggins	Summit City	EC/IN
Shasta State Historic Park	Highway 299, west of Redding	EC/IN
Shasta 47	Sacramento River - Redding	CULT
Texas Springs	Texas Springs Road	EC/IN

Name	Location	Theme[2]

[1] The heritage resources listed here include resources listed in the national Register of Historic Places the California Historical landmarks series, or the California Points of Interest program. In addition to the resources listed there are approximately 500 known sites or areas of archaeological significance. The names and locations of these areas are not revealed in order to protect these sensitive resources. This information is on file with the Cultural Resources Section of the California Department of Parks and Recreation.

[2] Theme Code:

ARCH	Architecture	EX/SE	Exploration/Settlement	MIL	Military
CULT	Cultural (Aboriginal)	EX/IN	Economic/Industrial	REL	Religion
SO/ED	Social/Education				

* National Register of Historic Places site ** Information regarding the location of these resources is on file with the Cultural Resources Section of the California of parks and Recreation

Source: State of California Department of Parks and Recreation

4.8.2 ENVIRONMENTAL CONSEQUENCES

No Action Alternative

The No Action Alternative would introduce no new facilities, no new construction activities, or no direct effects to the physical environment, and would therefore not result in any direct effects to cultural resources. Indirect effects to cultural resources, due to planned growth and development within the unincorporated portions of Shasta County, or within the City of Redding (Buckeye area) or City of Shasta Lake, would be expected to occur over the next 25 years. Generally, such changes in land use are predicted to occur throughout Shasta County, independent of the long term contract renewals, as the area transitions from a rural economy to a more suburban economy.

Under the No Action Alternative, indirect impacts could occur where property owners elect to change the use of their lands from agricultural uses to suburban or urban uses, or from suburban uses to agricultural use. These changes in land use could affect both known and undiscovered cultural resources. Where sensitive cultural resources occur, both federal and state jurisdictions provide programs to protect sensitive cultural resources.

For non-federal actions, such as changes to a County or City general plan or the approval of a use permit, a CEQA lead agency would be the responsible decision maker, and impacts on cultural resources would be evaluated pursuant to CEQA. Where a federal action would be approved, such as changes to the CVP service area boundary, a federal lead agency would be responsible for compliance under NEPA and Section 106 of the National Historic Preservation Act.

Alternative 1

Under Alternative 1 effects to cultural resources would be the same as the No Action Alternative. Therefore, no incremental environmental effects of this alternative are expected.

Alternative 2

Under Alternative 2 effects to cultural resources would be the same as the No Action Alternative. Therefore, no incremental environmental effects of this alternative are expected.

4.8.3 CUMULATIVE EFFECTS

Demographic, economic, political, and other factors, independent of implementation of Alternative 1 or 2, are causing changes with direct and indirect effects to cultural resources that are beyond the range of Reclamation's Section 106 responsibilities. Alternatives 1 and 2 fall within the range of the No Action Alternative conditions. Therefore, the alternatives would not contribute to cumulative impacts to cultural resources.

CHAPTER 5
OTHER ACTIVITIES

5.1 INTRODUCTION

Other activities that may have a relationship to the nine water service contractors in the Shasta and Trinity Divisions include the following actions described below.

- Implementation of the Bay-Delta Plan
- Completion of water transfer actions
- Completion of the Conformed Place of Use EIR for CVP Water Supplies
- Recommendations for increased instream flows in the Trinity River
- Implementation of the Sacramento and San Joaquin River Basins Comprehensive Study
- Changes in federal farm programs
- Changes in demand for agricultural products
- Implementation of Yield Increase Plan
- Additional listings of special-status species

A summary of the potential effects of these actions and how they may influence the effects of implementing the alternatives considered in this EA is presented in Table 5-1.

TABLE 5-1
SUMMARY OF CUMULATIVE EFFECTS

Action	Potential Results
Implementation of the Bay-Delta Plan Accord	Changes in Delta inflow and associated instream releases. Improved water supply reliability through the water quality improvement programs and potential development of groundwater and/or above ground storage and/or conveyance facilities.
Water Transfer Actions	Water transfers for both CVP and non-CVP water transfers
Place of Use EIR for CVP Water Supplies	Permitting of CVP water service areas currently served with CVP water but outside of authorized Place of Use.
Trinity River Studies	Changes in instream flow requirements for Trinity River.
CVP Operations and Maintenance Agreements	Transfer operations and maintenance responsibilities to local water user groups under the CVP.
Sacramento Water Forum Proposal	Changes in water demands and flow requirements on American River.

Action	Potential Results
Changes in Federal Farm Programs	If lands fallowed or retired due to CVP pricing actions continue to accumulate support payments, the net revenue to farmers may increase and the revenue to the Federal Treasury may not increase.
Changes in Demand for Agricultural Products	If changes in demand increase crop value, farmers would be less willing to sell water. If changes in demand decrease crop value, farmers would be more willing to sell water.
Yield Increase Plan	Development of facilities and programs to increase CVP water supplies could reduce impact of shortages
Future Listings under ESA of Special-Status Species	Initiation of consultation with the Service and National Marine Fisheries Service

5.2 IMPLEMENTATION OF BAY-DELTA PLAN ACCORD

As a follow-up to adoption of the 1995 Water Quality Control Plan for the San Francisco/ Sacramento-San Joaquin Delta Estuary, the State Water Resources Control Board (SWRCB) is evaluating alternatives for implementing that plan. The process included the SWRCB water rights process and the CALFED Bay-Delta Program.

5.3 SWRCB WATER RIGHTS PROCESS

The purpose of the SWRCB water rights process for Delta water quality and quantity is to develop a methodology to provide adequate flows to meet the Bay-Delta Plan Accord. The SWRCB process is evaluating several alternatives that would require different agencies, including the CVP and SWP, to release water in a manner to protect Delta quality.

This process may increase the amount of water provided by other water rights holders to meet Bay-Delta water quality standards, but it is anticipated that the impacts to the CVP water supply would not be more severe than the impacts presented in the PEIS and this EA. Consequently, operations of upstream projects may change. Because the outcome is not fully developed, a conservative assumption was used in modeling for the PEIS and this EA. It was assumed that the Bay-Delta Accord criteria would be the long-term plan for the Delta. If instream flows provided by the other water rights holders increase, some portion of the CALFED Ecosystem Restoration Program environmental flows could be satisfied by this water rights process, which may reduce the amount of water that the program needs to acquire from willing sellers. It may also reduce the amount of water that the program needs to develop or may allow for the developed water to be used more effectively in meeting program objectives. Any additional demand on water right holders could decrease the amount of water available for transfer.

5.4 CALFED-BAY DELTA PROGRAM

The CALFED Bay-Delta Program (CALFED Program) is a cooperative effort of 15 State and Federal agencies with regulatory and management responsibilities in the Bay-Delta system. The mission of the CALFED Bay-Delta Program is to develop a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The CALFED

Program began in May 1995 to address the complex issues that surround the Bay-Delta and the CALFED Agencies have completed the Final Programmatic Environmental Impact Statement/Report (EIS/EIR) including the Preferred Program Alternative. The August 28, 2000 signing of the CALFED Programmatic Record of Decision (ROD) marked the beginning of implementation for the 30-year program and details on implementation during Stage 1 (the first 7 years of the implementation).

The CALFED Preferred Program Alternative includes the following components: Ecosystem Restoration, Watershed Protection, Water Supply Reliability, Water Storage and Conveyance, Environmental Water Account and Commitments, Water Use Efficiency and Conservation, Water Quality Improvements, Water Transfers, Levee System Integrity, Science Program, Establishment of a Governance Structure for Implementation of CALFED, and a Regional Approach to Ecosystem/Water Management.

Many of these programs could improve water supply reliability and water quality for CVP water service contractors, especially those located south of the Delta. The CALFED Preferred Program Alternative includes the following tools to improve water supply reliability and water quality.

- Water Use Efficiency Program (agricultural, urban, and wetland water conservation and water recycling)
- Water Transfer Program
- Conveyance, including South Delta Improvements
- Surface and groundwater storage
- Operational strategies, such as real-time diversion management through use of the Environmental Water Account
- Water quality improvements to enable users to divert more water to storage during periods of high Delta water quality, reduce contaminants and salinity that impair Delta water quality, evaluate alternative approaches to address disinfection byproducts and salinity issues, and enable voluntary exchanges or purchases of high quality source waters for drinking water uses.

In addition, other parts of the CALFED Program can provide water supply reliability and water quality benefits. These include the Watershed Program and real-time monitoring through the Science Program.

CALFED's goals for water supply reliability include:

- Increase the utility of available water supplies (making water suitable for more uses and reuses)
- Improve access to existing or new water supplies, in an economically efficient manner, for environmental, urban and agricultural beneficial uses
- Improve flexibility of managing water supply and demand in order to reduce conflicts between beneficial uses, improve access to water supplies, and decrease system vulnerability.

The CALFED Final Programmatic EIS/EIR shows that on an annual basis, without additional storage, the Preferred Program Alternative increases long-term period Delta exports by an additional 250,000 to

380,000 acre-feet over the CALFED No-Action Alternative which is similar to the PEIS No-Action Alternative. With additional storage, the Preferred Program Alternative increases annual Delta exports by 490,000 to 900,000 acre-feet over the CALFED No-Action Alternative.

On an annual basis, without additional storage, the Preferred Program Alternative increases dry and critical year Delta exports by an additional 50,000 to 180,000 acre-feet over the CALFED No-Action Alternative. With additional storage, the Preferred Program Alternative increases annual Delta exports from 180,000 to 670,000 acre-feet over the CALFED No-Action Alternative.

In addition, water conservation and recycling will save additional water for use. Water use efficiency potential varies significantly in California, depending on the region of the State and the sector involved. Working with the stakeholder steering committees and other technical experts, CALFED Agencies have developed ranges of estimated water savings during Stage 1. These estimates include only water that is currently unavailable for other uses because it is lost to excessive evaporation or drains to the ocean or some other unusable destination. In addition water can be made available through water reclamation projects. These water savings would include 520,000 to 688,000 acre-feet from urban uses, 260,000 to 350,000 acre-feet from agricultural uses, and 225,000 to 310,000 acre-feet in water reclamation projects for both urban and agricultural uses.

Actions initiated in the first four years of Stage 1 to improve storage and conveyance capacity will substantially increase water supply reliability in the later years, but these benefits will not be realized until the new facilities come on line. Similarly, it will take years to implement and fully realize the water supply benefits of water use efficiency, recycling and other conservation measures. Therefore the greatest challenge to improving water supply reliability lies in the first four years of Stage 1. To address these water supply reliability challenges in this short period, the CALFED Record of Decision outlines the following actions.

- Establishment of an Environmental Water Account (EWA) with an average of 380,000 acre-feet set aside annually in the first years to provide additional water for fishery purposes beyond the regulatory baseline.
- Establishment of a Regulatory Baseline by delineating existing regulatory requirements and clarifying implementation of specific regulatory actions.
- A commitment that there will be no reductions, beyond the baseline regulatory levels resulting from measures to protect fish.
- Seek SWRCB approval of Joint Point of Diversion and share water derived from Joint Point of Diversion between the CVP and the EWA.
- Implement conjunctive management projects, water conservation measures and water transfers.
- Begin implementation of storage projects.
- Allocate Proposition 13 funds dedicated to interim water supply reliability and water quality.

The CALFED ROD also concludes that these actions in the first four years are likely to improve Delta exports for CVP south-of-Delta agricultural water service contractors, as cited below.

"In the first four years of Stage 1, it is anticipated that water deliveries will remain at recent levels for most water users who depend upon water from the CVP, including Exchange Contractors, North of Delta CVP agricultural contractors, refuges, and M&I contractors, as well as for SWP contractors and non-project water users. It is also anticipated that implementation of Joint Point of Diversion, operational flexibility, interagency cooperation, EWA implementation, and other cooperative water management actions (some of which may require further specific environmental review) will result in normal years in an increase to CVP south-of-Delta agricultural water service contractors of 15 percent (or greater) of existing contract totals to 65 to 70 percent. This normal year supply improvement may not be achieved in all years due to annual hydrologic variability and its impact on carryover storage conditions. Substantial progress toward implementation of other program elements, such as development of EWA assets, is also necessary. Water supplies in dry years are likely to be less than the anticipated amounts and more in above normal years. As discussed in the ROD, CALFED Agencies are committed to working with local agencies to implement these regional supply actions and to support local water management actions including conservation and other local measures. Part of this effort will include development of a plan for alternative refuge supplies and conveyance."

5.5 WATER TRANSFERS

The use of water transfers to allow water trades between willing sellers and buyers is expected by many experts to be used increasingly in the future. Transfers provide an opportunity to increase or replace water supplies to support future demands. Overall, implementation of water transfer programs will meet part of the water demand that has been identified by DWR as being unmet by current water supplies. The DWR identified 2.9 to 4.9 million acre-feet of projected water demand that would not be met by existing water facilities, water conservation, and wastewater reclamation if all entitlements and water rights continue to be delivered to existing users. Water transfers can be used in the future to reduce the currently unmet future demand. Therefore, water transfers may be beneficial from a cumulative statewide perspective. However, each transfer proposal must be evaluated individually to determine direct or indirect impacts at a project-specific level.

Cumulative impacts associated with the transfer of water must consider the impacts of other water transfers that would occur throughout the Central Valley. Reclamation has purchased water in the Sacramento and San Joaquin valleys from water rights holders to improve instream fishery flows, Delta outflows, and refuge water supplies. Water also has been purchased on an annual basis by agricultural users on both the eastern and western sides of the San Joaquin Valley to improve water reliability. Water users located in the watersheds of the upper Sacramento, Feather, Yuba, and Bear have participated or are considering participation in short-term water transfers of one to five-year periods for water supplies and/or fish and wildlife uses. However, projects and locations have not been fully evaluated at this time.

Specific water transfers may reduce the ability of other agencies to purchase and transfer water. If the amount of water available for transfers is reduced, the users who do not purchase the water will either increase groundwater withdrawals which may lead to increased rates of overdraft and subsidence, or purchase more expensive water supplies which could increase the cost of agricultural crops or reduce net revenues.

Transfers of water held in post-1914 water rights must be evaluated in some type of environmental documentation. These environmental documents evaluate several issues, including the following items, which may have potential adverse impacts.

- Transfers that could reduce Delta inflow during certain critical time periods
- Entrainment losses of some fish due to diversions at new locations
- Losses of fish due to changes in flow patterns that may raise temperatures or dewater or flood spawning areas
- Reduced reservoir levels and associated recreation actions
- Reduced irrigated acreage and wetlands due to changes in water use or return flows
- Reduced employment opportunities due to land fallowing to make the water available
- Reduced groundwater levels due to the replacement of transferred water with additional withdrawals or due to reduction in applied irrigation water that percolates into the aquifer.

It has been difficult in many cases to complete the environmental documentation and obtain approval from the SWRCB, SWP, or CVP during an irrigation season in a timely manner. If these approvals do not occur in a timely manner, unnecessary water may be purchased or users may decide to defer actions that would require full water supplies.

To alleviate this issue, several programmatic environmental documents have been completed and the overall concepts are included in the Long-Term Contracts considered under Alternatives 1 and 2. For example, Reclamation completed the Eastside/Westside Water Transfer/Exchange EA for approval of annual exchange/transfer(s) of up to 150,000 acre-feet of CVP water between CVP contractors through an internal exchange of SWP water by the Kern County Water Agency. This approval process would be in effect for 5 years, between March 2001 and February 2006. Specific transfers under this type of program would be compared with the specific approved actions to determine that adverse environmental impacts would not occur.

Similar programmatic approaches for approval of transfers within regional trading zones are being considered under the CALFED process and through the Governor's Drought Contingency Panel.

5.6 CONFORMED PLACE OF USE EIR FOR CVP WATER SUPPLIES

Some existing CVP service areas that may be out of the SWRCB Authorized Place of Use have been served with CVP water. This process considered the impacts of expanding the SWRCB designated place of use for CVP water to include these areas. The SWRCB adopted the EIR as part of the approval process. The modeling for the PEIS assumed that the process will be completed by 2025 and will include lands currently receiving CVP water. If water districts propose to deliver future water beyond the assigned place of use, the Authorized Place of Use would need to be modified.

5.7 TRINITY RIVER STUDIES

In October 1984, the Service began a 12-year study to describe the effectiveness of increased flows and other habitat restoration activities to restore fishery populations in the Trinity River. An EIS/EIR is being prepared under a concurrent program to evaluate alternatives to restore and maintain natural production of anadromous fish in the Trinity River main stem downstream of Lewiston Dam. Historically, an average annual quantity of approximately 1.3 million acre feet of water have been diverted from the Trinity River to the Sacramento River system (1964-1992). A change in the Trinity River flow requirements and a corresponding change in the amount of water diverted to the Sacramento River system could affect future flows to the Delta. Changes also could affect overall water supply reliability and carryover storage in Shasta Reservoir, and water quality and temperature in the Sacramento River.

The alternatives in this EA assumed minimum instream flow requirements for Trinity River of 390,000 acre-feet/year in critical dry years to 750,000 acre-feet/year in extremely wet years, which represented an initial flow recommendation in the draft Trinity River Flow Evaluation. That initial Trinity River flow recommendation has since been refined in the Trinity Flow Evaluation to 362,000 acre-feet/year in critical dry years to 815,000 acre-feet/year in extremely wet years. However, a Record of Decision has not yet been signed establishing the flow requirements for the Trinity River, so this EA and the PEIS must make assumptions about Trinity River flows for the purposes of analysis. To provide a broad range to the analysis in this PEIS, the Cumulative Effects Analysis assumed the final flow in the Flow Evaluation (which is also the Preferred Alternative in the Trinity River Flow draft EIR/EIS).

5.8 TRANSFER OF OPERATIONS AND MAINTENANCE RESPONSIBILITIES

Several of the local water user groups provide a portion of the operation and maintenance requirements for CVP facilities that only serve that user group. For example, Contra Costa Water District is responsible for operating and maintaining the Contra Costa Canal and Contra Loma Reservoir. Alternative 1 provides for this type of operations and maintenance. Any transfer of operations and maintenance for specific facilities to non-Federal entities could be completed under Alternative 1 following completion of appropriate environmental documentation and approvals.

5.9 CHANGES IN FEDERAL PROGRAMS

The 1996 Farm Bill revised the way commodity payments are determined, and decoupled the size of the payment from the actual production level. There remains, however, some uncertainty about how the U.S. Department of Agriculture (USDA) will handle lands that are part of a grower's base acreage, yet are retired or fallowed as CVPIA is implemented. For purposes of this EA analysis, it was assumed that USDA would remove such lands from the grower's base acreage and reduce the deficiency payment accordingly. The estimates of changes in farm commodity payments are based on that assumption.

If, instead, growers who retire or fallow their land as part of CVPIA implementation continue to receive program payments associated with that land, then no savings would accrue to the Federal treasury. However, net revenues to the farmers would increase. This may lead to greater participation in the water transfer market, which may lead to a lower cost for water. Either or both of these impacts could increase

the amount of water purchased by Interior for water acquisitions. Because the 1996 Farm Bill extends for only a limited number of years, great uncertainty remains about interactions between CVPIA and Federal commodity programs.

5.10 CHANGING DEMAND FOR AGRICULTURAL PRODUCTS

The PEIS and this EA analyses used real 1994 prices and costs, and did not attempt to estimate differential increases in prices and costs in the future. However, some evidence exists that demands for farm produce, especially fruits and vegetables grown in California, will increase in the future and cause their price to increase faster than the overall inflation rate. If this occurs, then the cost associated with acreage reductions estimated in this study are understated. Higher value for crops would increase the cost of water or reduce the willingness of sellers to participate in the transfer market. This would decrease the opportunities for Interior to acquire water for fish and wildlife purposes.

Another view is that increasing competition from expanding production regions, especially in Central and South America, will hold future price increases to below the level of inflation. Lower value for crops would decrease the cost of water or increase the willingness of sellers to participate in the transfer market. Changes in demand could change the ratio of permanent to annual crops. If more permanent crops were planted, the effects of changes in water availability on an annual basis could become more significant.

5.11 YIELD INCREASE PLAN

As part of the CVPIA, the Least-Cost Yield Increase Plan was completed to describe possible actions to increase CVP yield. The yield increase options considered in the plan ranged from purchase of water supplies, land fallowing, conjunctive use, water conservation, urban wastewater reuse, to off stream storage. New facilities, water reuse, and conjunctive use methods could reduce the shortages that are projected under the PEIS alternatives. The PEIS identified land fallowing and water conservation as measures to provide additional water supplies for fish and wildlife purposes. Implementation of water purchases for both purposes could cause conflicts, or could be implemented in a way that would benefit both programs. For example, if acquired water purchased to increase instream flows were diverted downstream of the critical reaches and stored in an off stream storage facility, both purposes would benefit. In addition, the cost to both users would be less.

5.12 ADDITIONAL LISTINGS OF SPECIAL-STATUS SPECIES

There is a high probability that new special-status species will be listed, and possibly de-listed. As the listings occur, Reclamation and the Service will follow the requirements under the Endangered Species Act and conduct consultation as required. Additional conservation actions are anticipated under the Conservation Program, AFRP, and CALFED which will aid in ecosystem restoration and improve the status of special-status species, so the need for future listings may be reduced.

CHAPTER 6

CONSULTATION AND COORDINATION

6.1 INTRODUCTION

Prior to preparation of this EA, input was solicited and incorporated from a broad range of cooperating and consulting agencies and the public. This chapter summarizes the public involvement program and key issues raised by the public and interest groups. This chapter also addresses the manner in which Federal statutes, implementing regulations, and executive orders potentially applicable to implementation of the CVPIA have been addressed. The conclusions of compliance are based on the Environmental Consequences presented in Chapter 4. The compliance summaries apply only to the alternatives discussed in this EA and not the development of concurrent CVPIA implementation programs.

6.2 PUBLIC INVOLVEMENT

Reclamation started the preparation of this EA with Scoping Meetings. Scoping served as a fact-finding process to identify public concerns and recommendations about the long-term contract renewal issues that would be addressed in this EA and the scope and level of detail for analyses. Scoping activities began in October 1998 after a Notice of Intent to prepare environmental documentation for long-term contract renewals was filed in the Federal Register. The scoping period formally ended in January 1999. The Scoping Report was released in summer of 1999.

Public input continued during long-term contract negotiations to define the contract language. Discussions were also held with the Shasta and Trinity long-term water service contractors during the preparation of this document.

At public scoping meetings, Reclamation provided information about the long-term contract renewal process, and solicited public comments, questions, and concerns. At these meetings, participants had numerous comments and questions about how important issues would be considered both in the PEIS and the long-term contract renewal process. The majority of the comments received during the Scoping process addressed the Needs Assessment methodology to be used as part of the long-term contract renewal process. Contract renewal negotiation issues were also addressed. The least number of comments addressed environmental review issues.

Reclamation received numerous comments about issues to be considered in the PEIS and methodologies for analyzing impacts. Comments concerning the development of alternatives were considered in the formation of the alternatives. However, a decision was made to focus the description of alternatives on the contract proposals, and to address issues related to water supply improvements being addressed by CALFED and the Least Cost Yield study. Consideration of

comments on methods to address impacts were considered in the development of the Environmental Consequences section of this EA. However, the impact analysis focused on the comparison of the alternatives with the projected No-Action Alternative, not the Existing Conditions scenario.

The level of detail for this EA was determined based upon the comments received and the decision to focus the alternatives on the language in the proposed contracts. It was also determined that based upon the minimal differences between Alternatives 1 and 2, an EIS would not be required.

6.3 CONSULTATION WITH OTHER AGENCIES

This EA was prepared in accordance with the policies and regulations for the following issues. Brief discussions of these issues and how compliance was addressed in this EA is discussed in the remaining sections of this chapter. Work is continuing on each of these requirements. As individual projects are implemented, compliance requirements will be considered.

- National Environmental Policy Act (NEPA)
- California Environmental Quality Act (CEQA)
- Endangered Species Act (ESA)
- Fish and Wildlife Coordination Act (FWCA)
- National Historic Preservation Act (NHPA)
- Indian Trust Assets (ITA)
- Indian Sacred Sites on Federal Land
- Environmental Justice
- State, Area-wide, and Local Plan and Program Consistency
- Floodplain Management
- Wetlands Protection
- Wild and Scenic Rivers Act
- Farmland Protection Policy Act and Farmland Preservation
- Clean Air Act
- Safe Drinking Water Act (SDWA)
- Clean Water Act (CWA)

6.3.1 NATIONAL ENVIRONMENTAL POLICY ACT

This EA was prepared pursuant to regulations implementing the National Environmental Policy Act (NEPA) (42 USC 4321 *et seq.*). NEPA provides a commitment that Federal agencies will consider the environmental effects of their actions. This EA tiers off of the PEIS (40 CFR 1508.28) and evaluates the potential site-specific environmental and socioeconomic effects of renewing the long-term water service contracts for the Shasta and Trinity Divisions. This EA also provides information regarding the No-Action Alternative and alternatives, and environmental impacts of the alternatives.

6.3.2 CALIFORNIA ENVIRONMENTAL QUALITY ACT

Implementation, funding and permitting actions carried out by State and local agencies must comply with the California Environmental Quality Act (CEQA). The CEQA requirements are similar to NEPA requirements. This EA could be used as a basis for preparation of a CEQA document.

6.3.3 ENDANGERED SPECIES ACT

Reclamation is preparing a biological assessment to determine if the proposed action will affect listed threatened and endangered species. The biological assessment addresses all species affected by the action of contract renewals in the water divisions. If the biological assessment indicates that a listed species may be affected, Reclamation will request formal consultation pursuant to the ESA.

6.3.4 FISH AND WILDLIFE COORDINATION ACT

The FWCA requires that Reclamation consult with fish and wildlife agencies (federal and state) on all water development projects that could affect biological resources. the implementation of the CVPIA, of which this action is a part, has been jointly analyzed by Reclamation and the USFWS and is being jointly implemented. This continuous consultation and consideration of the views of the USFWS in addition to their review of this document and consideration of their comments satisfies any applicable requirements of the FWCA.

6.3.5 NATIONAL HISTORIC PRESERVATION ACT

Section 106 of the National Historic Preservation Act (NHPA) requires that Federal agencies evaluate the effects of Federal undertakings on historical, archeological, and cultural resources and afford the Advisory Council on Historic Preservation opportunities to comment on the proposed undertaking. The first step in the process is to identify cultural resources included on (or eligible for inclusion on) the National Register of Historic Places that are located in or near the project area. The second step is to identify the possible effects of proposed actions. The lead agency must examine whether feasible alternatives exist that would avoid such effects. If an effect cannot reasonably be avoided, measures must be taken to minimize or mitigate potential adverse effects. Reclamation staff will complete the 106 consultation process prior to implementing any actions.

6.3.6 INDIAN TRUST ASSETS

The United States Government's trust responsibility for Indian resources requires Reclamation and other agencies to take measures to protect and maintain trust resources. These responsibilities include taking reasonable actions to preserve and restore tribal resources. Indian Trust Assets (ITAs) are legal interests in property and rights held in trust by the United States for Indian tribes or individuals. Indian reservations, rancherias, and allotments are common ITAs. Based upon information provided by Reclamation, no ITAs exist within the Shasta and Trinity Divisions.

6.3.7 INDIAN SACRED SITES ON FEDERAL LAND

Executive Order 13007 provides that in managing Federal lands, each Federal agency with statutory or administrative responsibility for management of Federal lands shall, to the extent practicable and as permitted by law, accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and avoid adversely affecting the physical integrity of such sacred sites. No sacred sites were identified during the scoping or planning process, and therefore were not included in the impact assessment of this EA.

6.3.8 ENVIRONMENTAL JUSTICE

Executive Order 12898 requires each Federal agency to achieve environmental justice as part of its mission, by identifying and addressing disproportionately high and adverse human health or environmental effects, including social or economic effects, of programs, policies, and activities on minority populations and low-income populations of the United States. This EA has evaluated the environmental, social, and economic impacts on minority and low-income populations in the impact assessment of alternatives. No disproportionate impacts on minority or low-income populations were identified.

6.3.9 STATE, AREA-WIDE, AND LOCAL PLAN AND PROGRAM CONSISTENCY

Executive Order 12372 requires that federal agencies provide for opportunities for state and local officials to provide input on proposed federal assistance or development actions. Consistency of the proposed action with the plans and policies of the City of Redding, City of Shasta Lake, and Shasta County have been considered, and input from federal, state, and local officials has been sought in developing the analysis for this EA. The Draft EA will be circulated to the appropriate state and local agencies to satisfy review and consultation requirements.

6.3.10 FLOODPLAIN MANAGEMENT

If a Federal agency program will affect a floodplain, the agency must consider alternatives to avoid adverse effects in the flood plain or to minimize potential harm. Executive Order 11988 requires Federal agencies to evaluate the potential effects of any actions they might take in a floodplain and to ensure that planning, programs, and budget requests reflect consideration of flood hazards and floodplain management. The alternatives would not affect floodplain management as compared to the No-Action Alternative.

6.3.11 WETLANDS PROTECTION

Executive Order 11990 authorizes Federal agencies to take actions to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands when undertaking Federal activities and programs. Any agency considering a proposal that might affect wetlands must evaluate factors affecting wetland quality and survival. These factors should include the proposal's effects on the public health, safety, and welfare due to modifications in water supply and water quality; maintenance of natural ecosystems and conservation of flora and fauna; and other recreational, scientific, and cultural uses. The alternatives would not affect wetlands as compared to the No-Action Alternative.

6.3.12 WILD AND SCENIC RIVERS ACT

The Wild and Scenic Rivers Act designates qualifying free-flowing river segments as wild, scenic, or recreational. The Act establishes requirements applicable to water resource projects affecting wild, scenic, or recreational rivers within the National Wild and Scenic Rivers System, as well as rivers designated on the National Rivers Inventory. Under the Act, a Federal agency may not assist the construction of a water resources project that would have a direct and adverse effect on the free-flowing, scenic, and natural values of a wild or scenic river. If the project would affect the free-flowing characteristics of a designated river or unreasonably diminish the scenic, recreational and fish and wildlife values present in the area, such activities should be undertaken in a manner that would minimize adverse impacts and should be developed in consultation with the National Park Service. None of the EA alternatives would adversely effect flows in wild and scenic, or recreational rivers.

6.3.13 FARMLAND PROTECTION POLICY ACT AND FARMLAND PRESERVATION

Two policies require federal agencies to include assessments of the potential effects of a proposed project on prime and unique farmland. These policies are the Farmland Protection Policy Act of 1981 and the Memoranda on Farmland Preservation, dated August 30, 1976, and August 11, 1980, respectively, from the U.S. Council on Environmental Quality. Under requirements set forth in these policies, federal agencies must determine these effects before taking any action that could result in converting designated prime or unique farmland for nonagricultural purposes. If implementing a project would adversely affect farmland preservation, the agencies must consider alternatives to lessen those effects. Federal agencies also must ensure that their programs, to the extent practicable, are compatible with state, local, and private programs to protect farmland. The Natural Resource Conservation Service (NRCS) is the federal agency responsible for ensuring that these laws and polices are followed. No specific consultation was conducted during preparation of this EA. The alternatives would not affect agricultural or urban lands as compared to the No-Action Alternative.

6.3.14 CLEAN AIR ACT

The Federal Clean Air Act (CAA) was enacted to protect and enhance the nation's air quality in order to promote public health and welfare and the productive capacity of the nation's population. The CAA requires an evaluation of any federal action to determine its potential impact on air quality in the project region. Coordination is required with the appropriate local air quality management district as well as with the EPA. This coordination would determine whether the project conforms to the Federal Implementation Plan and the State Implementation Plan (SIP).

Section 176 of the CAA (42 U.S.C. Section 7506(c)) prohibits federal agencies from engaging in or supporting in any way an action or activity that does not conform to an applicable SIP. Actions and activities must conform to a SIP's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards and in attaining those standards expeditiously. EPA promulgated conformity regulations (codified in 40 CFR Section 93.150 *et seq*.).

The alternatives assume that current practices to control dust and soil erosion on lands that are seasonally fallowed would continue and the land use agencies would continue to work with the air quality districts. Therefore, it assumed that no air quality impacts would occur due to the alternatives as compared to the No Action Alternative.

6.3.15 SAFE DRINKING WATER ACT

The Safe Drinking Water Act (SDWA) (PL 99-339) became law in 1974 and was reauthorized in 1986 and again in August 1996. Through the SDWA, Congress gave the EPA the authority to set standards for contaminants in drinking water supplies. Amendments to the SDWA provide more flexibility, more state responsibility, and more problem prevention approaches. The law changes the standard-setting procedure for drinking water and establishes a State Revolving Loan Fund to help public water systems improve their facilities and to ensure compliance with drinking water regulations and to support state drinking water program activities.

Under the SDWA provisions, the California Department of Health Services has the primary enforcement responsibility. The California Health and Safety Code establishes this authority and stipulates drinking water quality and monitoring standards. To maintain primacy, a state's drinking water regulations cannot be less stringent than the federal standards. The analysis of the EA alternatives as compared to the SDWA requirements indicated that there were no changes in compliance as compared to the No-Action Alternative.

6.3.16 CLEAN WATER ACT

The Clean Water Act (CWA) gave the EPA the authority to develop a program to make all waters of the United States "fishable and swimmable." This program has included identifying existing and proposed beneficial uses and methods to protect and/or restore those beneficial uses. The CWA contains many provisions, including provisions that regulate the discharge of pollutants into water bodies. The discharges may be direct flows from point sources, such as an effluent from a wastewater treatment plant, or a non-point source, such as eroded soil particles from a construction site. The analysis of the EA alternatives as compared to the CWA requirements indicated that there were no changes in compliance as compared to the No-Action Alternative.

CHAPTER 7

REFERENCES, PERSONS CONSULTED, AND ACRONYMS

7.1 REFERENCES

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7.2 PERSONS CONSULTED

Cheryl Adcock	United States Forest Service
Nancy Anderson	Bureau of Reclamation
Don Bultema	Bureau of Reclamation
Mike Connor	City of Redding Water Division
Valene Day	Clear Creek Community Services District
Dennis Daily	City of Shasta Lake
Robert Dietz	Bella Vista Water District
Don Groundwater	Bella Vista Water District
Janice Heck	Mountain Gate Community Services District
Buford Holt	Bureau of Reclamation
Char Workman-Flowers	Clear Creek Community Services District
Kent Manuel	City of Redding, Planning Division
Pat Minturn	Shasta County Water Agency
Darrell Rankin	United States Forest Service
Lisa Stephens	Shasta Community Services District
Carla Thompson	City of Shasta Lake Planning Department
Scott Wall	Shasta County Public Works
Bill Walker	Shasta County Planning Divsion

7.3 ACRONYMS

AB	Assembly Bill
BVWD	Bella Vista Water District
CCCSD	Clear Creek Community Services District
CDOF	California Department of Finance
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
COS	cost-of-service
CVP	Central Valley Project
CVP-OCAP	Central Valley Project-Operations Criteria and Plan
CVPIA	Central Valley Project Improvement Act

CWA	Clean Wateer Act
DAV	Drainage Area Units
DWR	Department of Water Resources
EA	Environmetnal Assessment
EIR	Environmental Impact Report
FC	full cost
ITAs	Indian Trust Assets
KCSA	Keswich County Service Area
M&I	municipal and industrial
MGCSD	Mountain Gate Community Services District
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
O&M	operations and maintenance
PEIS	Programmatic Environmental Impact Statement
ROD	Record of Decision
RRA	Reclamation Reform Act
SCSD	Shasta Community Services District
SCWA	Shasta County Water Agency
SDAPUD	Shasta Dam Area Public Utilities District
SDWA	Safe Drinking Water Act
SWP	State Water Project
SWRCB	State Water Resources Control Board
USFS	United States Forest Service
USFWS	U.S. Fish and Wildlife Service
WD	Water District

APPENDIX A

LIST OF PREPARERS

APPENDIX A

LIST OF PREPARERS

U.S. BUREAU OF RECLAMATION

Al Candlish, Program Manager
Buford Holt, Environmental Specialist
Donald Bultema, Conservation Coordinator

North State Resources, Inc.

Laura Kuh, Project Manager
Timothy Reilly, Senior Environmental Planner
Wirt Lanning, Environmental Planner
Stephanie Paschal, Wildlife Biologist

Dornbusch and Company

Jason Bass, Senior Economist

Francis Berg, ***Cultural Resources Specialist***

With coordination assistance from Gwen Buccholz, **CH2M Hill**

APPENDIX B

DISTRIBUTION LIST

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APPENDIX C

SPECIAL STATUS SPECIES LIST

APPENDIX C: STATE AND FEDERALLY LISTED WILDLIFE AND PLANT SPECIES THAT COULD POTENTIALLY BE AFFECTED BY PROJECTS IN SHASTA COUNTY

This Appendix lists the 20 state and federally listed species and one critical habitat that could potentially occur in Shasta County. The general habitat association for each species is also included.

The following special-status designations are applicable to these species: Endangered (E), Threatened (T), and Rare (R). Some species may be both state and federally listed.

		Status	
Species Common Name and (Scientific Name)	**General Habitat**	**CA Status**	**Fed**
Birds			
Bald eagle (*Haliaeetus leucocephalus*)	Aquatic habitats/ associated upland	SE	T
American peregrine falcon (*Falco peregrinus anatum*)	Valley foothill riparian/ annual grassland/blue oak-grey pine/aquatic	SE	D
Swainson's hawk (*Buteo swainsoni*)	Open grasslands/agricultural land	T	-
Northern spotted owl (*Strix occientalis caurina*)	Mixed conifer	-	T
Critical habitat, northern spotted owl	See above	-	T
Aleutian Canada goose (*Branta canadensis leucopareia*)	Aquatic habitats/vernal pools/agricultural land/pastureland	-	T
Greater sandhill crane (G*rus canadensis*)	Irrigated agricultural land/pastureland/wet meadow/marsh vernal pool	T	-
Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)	Valley foothill riparian	E	-
Bank swallow (Riparia riparia)	Aquatic habitats/vertical banks with friable soil	T	-
Willow flycatcher (*Empidonax traillii*)	Montane riparian/wet meadow/ above 2,000 feet	T	-
Amphibians			
California red-legged frog (*Rana aurora draytonii*)	Aquatic habitats/wetlands/valley foothill riparian	-	T
Shasta Salamander (*Hydromantes shastae*)	Chapparal or grey pine in proximity to limestone formations/oak woodland/mesic sites within mixed conifer habitat	T	-
Mammals			
California wolverine (*Gulo gulo luteus*)	Mixed conifer/wet meadow/montane above 1,600 feet	T	-
Sierra Nevada Red Fox (Vulpes vulpes necator)-native	Mixed conifer habitat at mid- to upper-elevations (above +/- 3,500 feet)	T	
Invertebrates			
Vernal pool tadpole shrimp (*Lepidurus packardi*)	Vernal pools	-	E
Vernal pool fairy shrimp (*Branchinecta lynchi*)	Vernal pools	-	T
Shasta crayfish (*Pacifastacus fortis*)	Streams in the Pit River/Fall River/Hat Creek drainages	E	E
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	Valley foothill riparian/ elderberry shrubs	-	T
Plants			
Greene's tuctoria (*Tuctoria greenei*)	Vernal pools	R	E
Slender Orcutt grass (*Orcuttia tenuis*)	Vernal pools	T	E
Boggs Lake hedge-hyssop (*Gratiola heterosepala*)	Vernal pools/marshes/swamps/lake margins	E	-
Red Mountain catchfly (*Silene campanulata ssp. campanulata*)	Chaparral/lower montane coniferous forest/rock/serpentine	E	-

Per CFDG literature, there are no identified deer migration corridors, fall holding areas, fawning grounds, or critical winter range within the study area (Shasta County DRM 1998). However, deer are known to use all of the habitats described above.

APPENDIX D

TECHNICAL MEMORANDUM
ECONOMIC ANALYSIS OCTOBER 2, 2000

Economic Analysis of November 1999 Tiered Pricing Proposal for PEIS Preferred Alternative

Date: October 2, 2000

This submittal presents the results of an Economic Analysis of the application to the PEIS Preferred Alternative of the November 1999 unit rates for CVP water and Tiered Pricing Proposal.

The PEIS Preferred Alternative included assumptions for the tiered pricing of CVP water that were developed during the preparation of the Draft PEIS. Subsequent to completion of the Final PEIS, a different tiered pricing proposal was developed. In addition, the PEIS assumed 1992 CVP water rates. This analysis includes the 1999 water rates. This submittal applies the new water rates and the November 1999 proposal to the Preferred Alternative and compares the results to the impact analysis of the PEIS Preferred Alternative. The level of detail presented in this submittal is consistent with the level of detail presented in the main PEIS document and the technical appendices. Tables are presented in the same format as used in the PEIS.

The economic analysis includes an evaluation of agricultural economics using Central Valley Production Model (CVPM), municipal and industrial water use economics for CVP water using the spreadsheet presented with the PEIS, and regional economics using IMPLAN. This memorandum discusses the new assumptions in the November 1999 proposal. However, this memorandum does not discuss the basic assumptions used in the PEIS models and analytical tools. This memorandum must be used in conjunction with the Draft PEIS and Final PEIS, including the methodology and modeling technical appendices, to explain the overall assumptions for evaluating the Preferred Alternative in the PEIS.

For the Agricultural Land Use and Economics analysis, the methodology used for applying CVP water rates was modified to allow for the new tiered pricing and the use of blended rates to determine a total water rate for all CVP water applied by an irrigation district or agency. These changes result in changes in water use due to the affordability of CVP water supplies, not a change in reliability.

For the Municipal and Industrial Water Use Economics analysis, blended rates had been used in the PEIS analysis. In addition, this analysis assumes that the municipal and industrial users will be able to afford the calculated water costs, as described in the PEIS. Therefore, CVP water deliveries do not change for the municipal and industrial analysis. The Regional Economics analysis reflects only changes to agricultural and municipal and industrial sectors, but not recreation sectors.

Table of Contents for Technical Memorandum

SECTION 1
AGRICULTURAL LAND USE AND ECONOMICS

CONTRACT RENEWAL PROPOSAL WITH BLENDED WATER RATES

In the November 1999 proposal, Reclamation has proposed that water sold to CVP water service contractors be sold according to tiered water rates as required by CVPIA section 3404. Reclamation has also proposed that two categories of water be identified. Category 1 water would be calculated as the average delivery of the previous five years, and would be split into three tiers according to the 80-10-10 quantities defined in the CVPIA. Category 2 water would be any water available in excess of the 5-year rolling average, up to the total contract amount as defined by the Needs Analysis.

Tier 1 water rates include the cost-of-service component and any applicable Restoration charges and surcharges. Both the Restoration Charge and the capital component of the cost-of-service rate are subject to ability-to-pay limits. These limits are in effect for Bella Vista WD and Clear Creek CSD, contractors on the Corning and Tehama-Colusa Canals, and contractors receiving water from New Melones.

Tier 3 water rates include the full-cost rate (as defined in the Reclamation Reform Act) and any applicable Restoration Charges. No ability-to-pay relief is provided in this Tier. The Tier 2 water rate is the average of the applicable Tier 1 and Tier 3 rates. Category 2 water has the same rate as Tier 3.

For this proposal, it is assumed that water conservation guidelines allow contractors to blend the rate of CVP water delivered in any tier or Category, and that they do blend the rates. This is different from the assumption used to assess alternatives in the PEIS, in which contractors were assumed to sell CVP water to growers at tiered rates. Differences between PEIS pricing assumptions and this analysis are:

- This analysis assumes that contractors blend the price of all CVP water received at tiered rates into a single rate. Tiered rates to growers are assumed in the PEIS.
- The project water portion of Sacramento River water rights settlement contracts are not subject to the new pricing policy in this analysis. In the PEIS it was assumed that it was subject to tiered rates.
- Rates are based on the Irrigation Water Rates spreadsheets provided by Reclamation in November 1999. PEIS rates used the 1994 Irrigation Water Rates manual.
- Ability-to-pay relief is incorporated using the current payment capacity studies for Shasta County irrigation contractors, Corning Canal contractors, Tehama Colusa Canal contractors, and New Melones contractors. In the PEIS, payment capacity was based on a 1992 regional study (PEIS, 1999).

- In this analysis, ability to pay relief is provided in Tier 1, with none in Tier 3 - Tier 2 is the average of Tiers 1 and 3, and so provides 50% relief. In the PEIS, the same dollar amount of ability to pay relief is applied in all pricing tiers.

- A $7.00 per acre-foot Restoration Charge is assumed in this analysis. A $6.50 per acre-foot charge was used in the PEIS. The Friant surcharge was $7.00 per acre-foot in both studies.

- There is no lower bound on the usage of CVP water. In the PEIS each subregion was restricted to using at least the Tier 1 quantity of CVP supplies.

METHODOLOGY

Other than the differences listed above, the modeling approach and underlying data were the same as used for the PEIS. The Central Valley Production Model (CVPM) was used in this analysis, with modifications needed to assess the specific water pricing conditions proposed. Table 1 shows the regions of the CVPM and the corresponding service areas. Groundwater hydrology was not assessed as it was in the PEIS alternatives. Therefore, for purposes of analysis, most regions were assumed to have access to replacement groundwater if needed. Based on groundwater hydrology as described in the PEIS, the following subregions are assumed to be unable to replace any CVP water with groundwater on a long term basis: Shasta County irrigation contractors (subregion 1), Corning Canal contractors (subregion 2), and the Tehama-Colusa service area (subregion 3B).

Water deliveries from the CVPIA Preferred Alternative were used (Reclamation CVPIA PEIS, 1999). These deliveries were allocated on a yearly basis into pricing tiers and categories according to the rules described above. Weighted average (i.e., blended) prices were calculated for each year, with quantities in each tier and category based on the previous five years of delivery. In any given year, the quantity and blended price of water depends on the 6-year sequence leading up to and including the current year. Throughout this report the following conventions are use: an Average rear represents the average 1922-1990 water delivery from the CVPIA Preferred Alternative (Reclamation CVPIA PEIS, 1999); a Wet year represents the average delivery for the period of 1967-1971 from the CVPIA Preferred Alternative; and a Dry year is the average 1928-1934 delivery from The CVPIA Preferred Alternative.

A total of nine water supply sequences are assessed in this analysis and compared to the CVPIA Preferred Alternative:

Average-Average:	An average water year following a 5-year sequence of average years.
Wet-Average:	An average water year following a 5-year sequence of wet years.
Dry-Average:	An average water year following a 5-year sequence of dry years.
Average-Wet:	A wet water year following a 5-year sequence of average years.
Wet-Wet:	A wet water year following a 5-year sequence of wet years.
Dry-Wet:	A wet water year following a 5-year sequence of dry years.
Average-Dry:	A dry water year following a 5-year sequence of average years.
Wet-Dry:	A dry water year following a 5-year sequence of wet years.
Dry-Dry:	A dry water year following a 5-year sequence of dry years.

The CVP water rates used for each of the nine sequences described above and the CVPIA Preferred Alternative tiered prices are shown in Table 3. Tables 4-12 show the available CVP water service contract supplies by tier and the blended price for each of the 22 subregions under the nine sequences proposed for the Long-Term Contract Renewal analysis.

Results are shown for each of the nine sequences presented as differences compared to the CVPIA Preferred Alternative. When calculating differences from the CVPIA Preferred Alternative, sequences ending in an Average, Wet and Dry years are compared to the Average, Wet and Dry year CVPIA Preferred Alternative results respectively.

IRRIGATED ACRES

Changes in irrigated acres from the Preferred Alternative are summarized by region in Table 13. A complete list of changes by crop and subregion is provided as Table 17.

Both the Average-Average and Wet-Average scenarios show little difference from the Preferred Alternative under the Average hydrology conditions. The Dry-Average sequence shows a larger reduction in irrigated acres almost all of which comes from the Sacramento River region. Compared to the Wet year Preferred Alternative results, there is a similar pattern for the three Long-Term Contract Renewal sequences ending with Wet years. For all three of the Long Term Contract Renewal Sequences ending in a dry year there minimal increases in irrigated acreage compared to the Dry year CPVIA Preferred Alternative results. Irrigated acres remain unchanged under all nine sequences in the San Felipe Division.

The reduction in acreage in Average and Wet years preceded by a series of Dry years is a result of higher CVP water costs. Since the quantity of Category 1 water is based on the average deliveries of the preceding five years, the quantity of water eligible for Category 1 classification shrinks when a sustained drought is experienced. In an average or wet year follows a drought period, water becomes available however a large portion is classified as Category 2 and is priced at the full cost rate. This can be seen in Tables 6 and 9. When this relatively large block of full cost water is incorporated into the blended water price, all CVP supplies become more expensive, and sometimes unaffordable. This result is not seen in the dry-dry sequence because there is not excess water that gets classified as Category 2.

GROSS AND NET REVENUE

Gross revenue (value of production) impacts follow acreage impacts quite closely, and are shown by region in Table 14. Compared to the Average Preferred Alternative, a small reduction of less than $1 million is estimated for the Average-Average and Wet-Average scenarios, and a $39 million reduction is estimated in Dry-Average scenario. Gross revenue also declines compared to the Wet Preferred Alternative with approximately $5 million reductions in Average and Wet years and a larger reduction of $29 million in the Dry-Wet scenario. In dry years preceded by all three hydrologic conditions, gross revenue is slightly higher when compared to the Preferred Alternative Dry year results. There were no changes in gross revenue for the San Felipe Division since there were no changes in irrigated acres compared to the CVPIA preferred Alternative. A complete list of changes in gross revenue by crop and subregion is provided as Table 18.

Net revenue impacts are separated into five components; Fallowed land, Groundwater pumping costs, Irrigation Costs, CVP water costs and higher crop prices. The CVP water cost component represents the impact to net revenue from changes in both the quantity of CVP water used and the price of CVP water. Therefore when the blended CVP water price increases, farmers frequently use less, and the net impact to the CVP water cost component can be positive even when the water price is higher. Table 15 summarizes the net income impacts by component. A negative entry in the table indicates a reduction in net revenue. A complete list of changes in net income by component for each subregion is provided as Table 19.

Relatively small net income impacts are seen in all water supply sequences at the State level. The Average-Average sequence compared to the Average year Preferred Alternative shows a decline of $2 million in net revenue for all of California. The Wet-Average scenario is estimated to have a net increase of approximately $4 million and the Dry-Average sequence a decrease of $12 million.

The net revenue impact in wet years relative to the Preferred Alternative wet results show a pattern similar to the Average year results. Dry years preceded by a series of Average and Wet years both show net decrease in revenue of about $12 million while the Dry-Dry sequence results in a $15 million decrease in State wide net revenue relative the Preferred Alternative Dry results.

Notice that following a series of dry years, the net revenue component associated with crop prices often results in a positive impact to net revenue. This occurs because some subregions are forced to reduce acreage because of higher blended CVP water prices, resulting in higher crop prices received for acreage that remains in production.

There is a negative impact to net revenue from irrigation costs in the Sacramento and San Joaquin River regions in each of the nine Long-Term Contract Renewal sequences. This impact is derived from the irrigation efficiency improvements induced by higher CVP water prices in the Average year sequences. The change in irrigation efficiency is carries through to the Wet and dry year sequences because they are short run analyses and irrigation technology is fixed in the short run. The increase in irrigation efficiency results in a reduction in the total water used in some subregions while irrigated acreage remains constant.

WATER USE

Table 16 summarizes water use changes by region. A complete list of changes in CVP water use and groundwater use by subregion is provided as Table 20. Water supplies other than CVP project water and groundwater are unaffected and not shown. The San Joaquin River region and most of the sequences for the Sacramento River region show the typical response represented by a shift away from CVP supplies to groundwater as CVP water becomes more expensive under the new pricing schemes. The Tulare Lake region and the Sacramento River region during wet years proceeded by a series of Average and Wet years show what would be considered an atypical response.

In the Sacramento River region when five years of Wet and Average conditions are followed by a wet year, the model predicts that both groundwater and CVP water use will decline relative to the Preferred Alternative Wet condition. The decrease in groundwater use is mostly attributed to subregion 3b. In this subregion in a wet year coming out of a series of Average or Wet years the blended price is cheaper than the Preferred Alternative Tier 2 water cost as well as the cost of pumping groundwater. Therefore there is a shift away from groundwater to CVP supplies. In Average years preceded by Average or Wet years, the subregion is prevented from shifting to CVP because they are already using their full CVP supply.

In the Tulare Lake region there is a pattern of shifting from groundwater to CVP water that can be attributed to subregions 17. This subregion shifts because under the blended pricing scheme the CVP water becomes cheaper than pumping groundwater; therefore they maximize their CVP water use.

In average and wet years preceded by a series of dry years, there is a large decrease in CVP water use in both the Sacramento and San Joaquin River regions. This is driven by the relatively high cost of CVP supplies under these conditions. Since many subregions receive less water in dry years, or the water falls into the higher tiers and it becomes unaffordable, and the base from which the blended price tier quantities is calculated shrinks. This sets up a condition where when an Average or Wet year comes along, the additional water is classified as Category 2 and assessed the full cost price. The CVP blended price is a weighted average of all CVP supplies therefore the cost for all CVP water increases and the supplies often become unaffordable.

LOCALIZED IMPACTS

Certain subregions are substantially affected by the proposed water pricing.

- The Tehama-Colusa service area is the most-affected region. Limited groundwater availability and very high full-cost price relative to the value of water in agricultural production result in almost 60,000 acres out of production in the Dry-Average sequence and substantially higher cost for lands remaining in production. This analysis shows a one-year snapshot. Because water pricing is based on historic delivery, a region (such as the Tehama-Colusa region) may never be able to "buy its way" back out from a drought. Looked at over a sequence of dry years such as 1928-34 or 1987-92, many or most of the districts in this area could not survive as CVP contractors.

- The analysis predicts that the Delta subregion will make a complete switch to groundwater supplies in all nine hydrologic sequences, assuming groundwater is available in all parts of the service area.

- The analysis estimates that the once an extended drought is experienced the Delta-Mendota service area would switch from its CVP water service supply to groundwater, assuming groundwater is available in all parts of the service area.

- Westlands Water District and many of the Friant Unit contractors would likely continue purchasing CVP water. Since these areas continue to purchase CVP supplies in all years coming out of drought conditions, they would eventually build their base deliveries up or "buy their way" back to pre-drought tier quantities and prices.

TABLE 1

CVPM SUBREGIONS AND DESCRIPTIONS

CVPM Subregion	Description of Major Water Users
1	CVP Users: Anderson Cottonwood, Clear Creek, Bella Vista, Sacramento River miscellaneous users.
2	CVP Users: Corning Canal, Kirkwood, Tehema, Sacramento River, miscellaneous users.
3	CVP Users: Glenn Colusa ID, Provident, Princeton-Codora, Maxwell, and Colusa Basin Drain MWC.
3B	Tehama Colusa Canal Service Area. CVP Users: Orland-Artois WD, most of County of Colusa, Davis, Dunnigan, Glide Kanawha, La Grande, Westside WD.
4	CVP Users: Princeton-Codora-Glenn, Colusa Irrigation Co., Meridian Farm WC, Pelger Mutual WC, Recl. Dist. 1004, Recl. Dist. 108, Robers Ditch, Sartain M.D., Sutter MWC, Swinford Tract IC, Tisdale Irrigation, Sacramento River miscellaneous users.
5	Most Feather River Region riparian and appropriative users.
6	Yolo, Solano Counties. CVP Users: Conaway Ranch, Sacramento River miscellaneous users.
7	Sacramento Co. north of American River. CVP Users: Natomas Central MWC, Sacramento River miscellaneous users, Pheasant Grove-Verona, San Juan Suburban.
8	Sacramento Co. south of American River, San Joaquin Co.
9	Delta Regions. CVP Users: Banta Carbona, West Side, Plainview.
10	Delta Mendota Canal. CVP Users: Pacheco, Del Puerto, Hospital, Sunflower, West Stanislaus, Mustang, Orestimba, Patterson, Foothill, San Luis WD, Broadview, Eagle Field, Mercy Springs, Pool Exchange Contractors, Schedule II water rights, more.
11	Stanislaus River water rights: Modesto ID, Oakdale ID, South San Joaquin ID.
12	Turlock ID.
13	Merced ID. CVP Users: Madera, Chowchilla, Gravely Ford.
14	CVP Users: Westlands WD.
15	Tulare Lake Bed. CVP Users: Fresno Slough, James, Tranquility, Traction Ranch, Laguna, Real. Dist. 1606.
16	Eastern Fresno Co. CVP Users: Friant-Kern Canal. Fresno ID, Garfield, International.
17	CVP Users: Friant-Kern Canal. Hills Valley, Tri-Valley Orange Cove.
18	CVP Users: Friant-Kern Canal, County of Fresno, Lower Tule River ID, Pixley ID, portion of Rag Gulch, Ducor, County of Tulare, most of Delano Earlimart, Exeter, Ivanhoe, Lewis Cr., Lindmore, Lindsay-Strathmore, Porterville, Sausalito, Stone Corral, Tea Pot Dome, Terra Bella, Tulare.
19	Kern Co. SWP Service Area.
20	CVP Users: Friant-Kern Canal. Shafter-Wasco, S. San Joaquin.
21	CVP Users: Cross Valley Canal, Friant-Kern Canal. Arvin Edison.

TABLE 2

CVP WATER RATES USED FOR LONG TERM CONTRACT RENEWAL ANALYSIS ($)

CVPM Subregion	Tiered Water Rates Used for LTCR analysis			Proposed Blended Water Rates for Water Service Contracts								
				Average	Wet	Dry	Average	Wet	Dry	Average	Wet	Dry
	Tier 1	Tier 2	Tier 3	Followed by Average			Followed by Wet			Followed by Dry		
1	12.01	37.56	63.12	19.67	14.98	14.14	23.91	19.67	18.20	25.19	21.09	19.67
2	10.71	36.40	62.09	18.42	10.71	49.66	29.55	18.42	52.83	10.71	10.71	18.42
3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B	10.25	40.73	71.21	19.39	10.25	58.15	32.35	19.39	61.42	10.25	10.25	19.39
4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5	20.65	23.01	25.36	21.35	21.18	21.77	21.52	21.35	21.92	20.90	20.81	21.35
6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7	11.77	12.07	12.37	11.86	11.86	11.86	11.86	11.86	11.86	11.86	11.86	11.86
8	10.00	27.46	44.92	15.24	10.00	30.36	25.64	15.24	35.47	10.00	10.00	15.24
9	24.79	55.14	85.50	33.89	24.79	64.53	55.27	33.89	73.22	24.79	24.79	33.89
10	31.15	40.16	49.16	33.85	31.15	42.94	38.01	33.85	44.63	31.15	31.15	33.85
11	0.00	0.00	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA
12	0.00	0.00	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA
13	32.16	38.41	44.65	34.04	33.25	37.44	34.77	34.04	37.94	32.16	32.16	34.04
14	32.62	46.48	60.33	36.78	32.62	50.76	43.17	36.78	53.36	32.62	32.62	36.78
15	32.71	41.91	51.10	35.47	34.55	38.10	36.34	35.47	38.82	33.07	32.71	35.47
16	40.48	46.78	53.08	42.37	41.22	45.32	43.40	42.37	46.07	40.48	40.48	42.37
17	34.18	40.49	46.79	36.07	35.15	39.28	36.92	36.07	39.88	34.18	34.18	36.07
18	33.63	40.48	47.33	35.69	34.73	39.16	36.57	35.69	39.78	33.63	33.63	35.69
19	34.58	42.16	49.73	36.86	35.00	41.21	38.84	36.86	42.52	34.58	34.58	36.86
20	34.58	42.16	49.73	36.86	35.70	40.85	37.92	36.86	41.58	34.58	34.58	36.86
21	32.70	39.00	45.31	34.59	32.98	39.01	36.33	34.59	40.03	32.70	32.70	34.59

NOTES:

1. Blended rates used pricing components from the November, 1999 Irrigation Water Rates spreadsheets, Restoration Charge of $7.00
2. PEIS rates used regional estimates of payment capacity and allowed the same ATP relief in all tiers.
3. Blended rates use most recent available payment capacity studies from Reclamation, and allow ATP relief in Tier 1 but not in Tier 3.
4. Only Class 1 rates are shown for Friant Division. Friant surcharge is $7.00 in all rates.

TABLE 3

CVP WATER RATES USED IN PREFERRED ALTERNATIVE ($)

CVPM Subregion	Tiered Water Rates Used in the PEIS Preferred Alternative ($)		
	Tier 1	Tier 2	Tier 3
1	5.91	14.63	23.35
2	11.83	24.7	37.57
3	2.83	5.27	7.71
3B	17.16	36.225	55.29
4	5.32	7.625	9.93
5	4.53	6.965	9.4
6	4.53	6.82	9.11
7	6.63	8.83	11.03
8	4.53	7.095	9.66
9	28.54	35.245	41.95
10	33.46	40.015	46.57
11	0	0	0
12	0	0	0
13	33.65	39.395	45.14
14	39.31	54.385	69.46
15	28.16	34.875	41.59
16	38.25	44.255	50.26
17	35.58	41.905	48.23
18	35.01	41.255	47.5
19	36.68	42.885	49.09
20	36.68	42.885	49.09
21	35.4	42.01	48.62

NOTES:
1. PEIS rates used pricing components from the 1994 Irrigation Water Rates Manual, Restoration Charge of $6.50
2. PEIS rates used regional estimates of payment capacity and allowed the same ATP relief in all tiers.
3. Only Class 1 rates are shown for Friant Division. Friant surcharge is $7.00 in all rates.

TABLE 4

PROJECT WATER APPLIED BY PRICING TIERS
AVERAGE YEAR FOLLOWING AVERAGE 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	9.4	1.2	1.2	-	$ 19.67
2	21.9	2.7	2.7	-	$ 18.42
3	-	-	-	-	NA
3B	159.7	20.0	20.0	-	$ 19.39
4	-	-	-	-	NA
5	16.0	2.0	2.0	-	$ 21.35
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	41.3	5.2	5.2	-	$ 15.24
9	22.5	2.8	2.8	-	$ 33.89
10	231.4	28.9	28.9	-	$ 33.85
11	-	-	-	-	
12	-	-	-	-	
13	153.6	19.2	19.2	-	$ 34.04
14	539.1	67.4	67.4	-	$ 36.78
15	32.3	4.0	4.0	-	$ 35.47
16	18.9	2.4	2.4	-	$ 42.37
17	34.9	4.4	4.4	-	$ 36.07
18	484.2	60.5	60.5	-	$ 35.69
19	13.1	1.6	1.6	-	$ 36.86
20	194.2	24.3	24.3	-	$ 36.86
21	129.7	16.2	16.2	-	$ 34.59

Table 5

PROJECT WATER APPLIED BY PRICING TIERS
AVERAGE YEAR FOLLOWING WET 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	10.4	1.3	0.0	-	$ 14.98
2	27.3	-	-	-	$ 10.71
3	-	-	-	-	NA
3B	199.6	-	-	-	$ 10.25
4	-	-	-	-	NA
5	16.6	2.1	1.2	-	$ 21.18
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	51.6	-	-	-	$ 10.00
9	28.2	-	-	-	$ 24.79
10	289.2	-	-	-	$ 31.15
11	-	-	-	-	NA
12	-	-	-	-	NA
13	165.0	20.6	6.3	-	$ 33.25
14	673.8	-	-	-	$ 32.62
15	34.2	4.3	1.9	-	$ 34.55
16	21.0	2.6	0.1	-	$ 41.22
17	37.9	4.7	1.0	-	$ 35.15
18	523.8	65.5	15.9	-	$ 34.73
19	15.5	0.9	-	-	$ 35.00
20	211.7	26.5	4.6	-	$ 35.70
21	154.9	7.2	-	-	$ 32.98

Table 6

PROJECT WATER APPLIED BY PRICING TIERS
AVERAGE YEAR FOLLOWING DRY 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	10.8	1.0	-	-	$ 14.14
2	6.2	0.8	0.8	19.6	$ 49.66
3	-	-	-	-	NA
3B	40.2	5.0	5.0	149.3	$ 58.15
4	-	-	-	-	NA
5	14.3	1.8	1.8	2.1	$ 21.77
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	20.2	2.5	2.5	26.3	$ 30.36
9	9.2	1.1	1.1	16.7	$ 64.53
10	94.0	11.8	11.8	171.7	$ 42.94
11	-	-	-	-	NA
12	-	-	-	-	NA
13	104.4	13.0	13.0	61.6	$ 37.44
14	219.1	27.4	27.4	400.0	$ 50.76
15	26.8	3.4	3.4	6.8	$ 38.10
16	13.7	1.7	1.7	6.5	$ 45.32
17	24.5	3.1	3.1	13.1	$ 39.28
18	339.7	42.5	42.5	180.6	$ 39.16
19	8.7	1.1	1.1	5.6	$ 41.21
20	133.9	16.7	16.7	75.3	$ 40.85
21	76.2	9.5	9.5	66.8	$ 39.01

Table 7

PROJECT WATER APPLIED BY PRICING TIERS
WET YEAR FOLLOWING AVERAGE 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	9.4	1.2	1.2	1.3	$ 23.91
2	21.9	2.7	2.7	9.4	$ 29.55
3	-	-	-	-	NA
3B	159.7	20.0	20.0	66.6	$ 32.35
4	-	-	-	-	NA
5	16.0	2.0	2.0	0.9	$ 21.52
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	41.3	5.2	5.2	27.8	$ 25.64
9	22.5	2.8	2.8	19.9	$ 55.27
10	231.4	28.9	28.9	107.8	$ 38.01
11	-	-	-	-	NA
12	-	-	-	-	NA
13	153.6	19.2	19.2	14.3	$ 34.77
14	539.1	67.4	67.4	251.2	$ 43.17
15	32.3	4.0	4.0	2.4	$ 36.34
16	18.9	2.4	2.4	2.5	$ 43.40
17	34.9	4.4	4.4	3.8	$ 36.92
18	484.2	60.5	60.5	49.6	$ 36.57
19	13.1	1.6	1.6	3.0	$ 38.84
20	194.2	24.3	24.3	21.9	$ 37.92
21	129.7	16.2	16.2	31.5	$ 36.33

Table 8

PROJECT WATER BY PRICING TIERS
WET YEAR FOLLOWING WET 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	10.4	1.3	1.3	-	$ 19.67
2	29.4	3.7	3.7	-	$ 18.42
3	-	-	-	-	NA
3B	212.9	26.6	26.6	-	$ 19.39
4	-	-	-	-	NA
5	16.6	2.1	2.1	-	$ 21.35
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	63.5	7.9	7.9	-	$ 15.24
9	38.5	4.8	4.8	-	$ 33.89
10	317.6	39.7	39.7	-	$ 33.85
11	-	-	-	-	NA
12	-	-	-	-	NA
13	165.0	20.6	20.6	-	$ 34.04
14	740.0	92.5	92.5	-	$ 36.78
15	34.2	4.3	4.3	-	$ 35.47
16	21.0	2.6	2.6	-	$ 42.37
17	37.9	4.7	4.7	-	$ 36.07
18	523.8	65.5	65.5	-	$ 35.69
19	15.5	1.9	1.9	-	$ 36.86
20	211.7	26.5	26.5	-	$ 36.86
21	154.9	19.4	19.4	-	$ 34.59

Table 9

PROJECT WATER APPLIED BY PRICING TIERS
WET YEAR FOLLOWING DRY 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	10.8	1.3	0.9	-	$ 18.20
2	6.2	0.8	0.8	28.9	$ 52.83
3	-	-	-	-	NA
3B	40.2	5.0	5.0	215.9	$ 61.42
4	-	-	-	-	NA
5	14.3	1.8	1.8	2.9	$ 21.92
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	20.2	2.5	2.5	54.1	$ 35.47
9	9.2	1.1	1.1	36.7	$ 73.22
10	94.0	11.8	11.8	279.5	$ 44.63
11	-	-	-	-	NA
12	-	-	-	-	NA
13	104.4	13.0	13.0	75.9	$ 37.94
14	219.1	27.4	27.4	651.1	$ 53.36
15	26.8	3.4	3.4	9.1	$ 38.82
16	13.7	1.7	1.7	9.1	$ 46.07
17	24.5	3.1	3.1	16.8	$ 39.88
18	339.7	42.5	42.5	230.2	$ 39.78
19	8.7	1.1	1.1	8.5	$ 42.52
20	133.9	16.7	16.7	97.2	$ 41.58
21	76.2	9.5	9.5	98.3	$ 40.03

Table 10

PROJECT WATER APPLIED BY PRICING TIERS
DRY YEAR FOLLOWING AVERAGE 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	9.4	1.2	1.2	1.7	$ 25.19
2	7.8	-	-	-	$ 10.71
3	-	-	-	-	NA
3B	50.3	-	-	-	$ 10.25
4	-	-	-	-	NA
5	16.0	1.9	-	-	$ 20.90
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	25.3	-	-	-	$ 10.00
9	11.5	-	-	-	$ 24.79
10	117.5	-	-	-	$ 31.15
11	-	-	-	-	NA
12	-	-	-	-	NA
13	130.4	-	-	-	$ 32.16
14	273.9	-	-	-	$ 32.62
15	32.3	1.3	-	-	$ 33.07
16	17.1	-	-	-	$ 40.48
17	30.6	-	-	-	$ 34.18
18	424.6	-	-	-	$ 33.63
19	10.9	-	-	-	$ 34.58
20	167.4	-	-	-	$ 34.58
21	95.3	-	-	-	$ 32.70

Table 11

PROJECT WATER APPLIED BY PRICING TIERS
DRY YEAR FOLLOWING WET 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	10.4	1.3	1.3	0.4	$ 21.09
2	7.8	-	-	-	$ 10.71
3	-	-	-	-	NA
3B	50.3	-	-	-	$ 10.25
4	-	-	-	-	NA
5	16.6	1.2	-	-	$ 20.81
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	25.3	-	-	-	$ 10.00
9	11.5	-	-	-	$ 24.79
10	117.5	-	-	-	$ 31.15
11	-	-	-	-	NA
12	-	-	-	-	NA
13	130.4	-	-	-	$ 32.16
14	273.9	-	-	-	$ 32.62
15	33.6	-	-	-	$ 32.71
16	17.1	-	-	-	$ 40.48
17	30.6	-	-	-	$ 34.18
18	424.6	-	-	-	$ 33.63
19	10.9	-	-	-	$ 34.58
20	167.4	-	-	-	$ 34.58
21	95.3	-	-	-	$ 32.70

Table 12

PROJECT WATER BY PRICING TIERS
DRY YEAR FOLLOWING DRY 5-YEAR BASE CONDITION

CVPM Subregion	Tier 1	Tier 2	Tier 3	Category 2	Blended Price ($/AF)
	(1000 AF)				
1	10.8	1.3	1.3	-	$ 19.67
2	6.2	0.8	0.8	-	$ 18.42
3	-	-	-	-	NA
3B	40.2	5.0	5.0	-	$ 19.39
4	-	-	-	-	NA
5	14.3	1.8	1.8	-	$ 21.35
6	-	-	-	-	NA
7	12.0	1.5	1.5	-	$ 11.86
8	20.2	2.5	2.5	-	$ 15.24
9	9.2	1.1	1.1	-	$ 33.89
10	94.0	11.8	11.8	-	$ 33.85
11	-	-	-	-	NA
12	-	-	-	-	NA
13	104.4	13.0	13.0	-	$ 34.04
14	219.1	27.4	27.4	-	$ 36.78
15	26.8	3.4	3.4	-	$ 35.47
16	13.7	1.7	1.7	-	$ 42.37
17	24.5	3.1	3.1	-	$ 36.07
18	339.7	42.5	42.5	-	$ 35.69
19	8.7	1.1	1.1	-	$ 36.86
20	133.9	16.7	16.7	-	$ 36.86
21	76.2	9.5	9.5	-	$ 34.59

TABLE 13

IRRIGATED ACRES BY SUBREGION (1000 ACRES)

CVPM Subregion	Average Preferred Alternative	Change Compared to Average followed by Average			Wet Preferred Alternative	Change Compared to Average followed by Wet			Dry Preferred Alternative	Change Compared to Average followed by Dry		
		Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
Sacramento River	2015.5	-1.7	-0.8	-65.3	2020.0	-4.4	-4.4	-53.0	1984.8	0.1	0.1	0.0
San Joaquin River	2526.6	-0.2	-0.2	-1.2	2529.1	-1.7	-1.6	-1.9	2505.9	-0.1	-0.1	-0.1
Tulare Lake	1992.4	0.0	0.0	-0.2	1996.2	-1.2	-1.2	-1.3	1953.7	0.1	0.1	0.1
San Felipe	50.7	0.0	0.0	0.0	69.5	0.0	0.0	0.0	22.2	0.0	0.0	0.0
California Total	6585.2	-1.9	-1.0	-66.7	6614.8	-7.3	-7.3	-56.2	6466.6	0.1	0.1	0.1

TABLE 14

VALUE OF PRODUCTION BY SUBREGION (Million $)

CVPM Subregion	Average Preferred Alternative	Change Compared to Average followed by Average: Average	Wet	Dry	Wet Preferred Alternative	Change Compared to Wet PA followed by Wet: Average	Wet	Dry	Dry Preferred Alternative	Change Compared to Dry PA followed by Dry: Average	Wet	Dry
Sacramento River	1,825.3	-0.4	-0.2	-37.6	1,828.0	-1.6	-1.6	-26.8	1,810.0	0.4	0.4	0.3
San Joaquin River	4,402.3	-0.1	-0.1	-1.0	4,403.8	-0.9	-0.9	-1.1	4,384.2	-0.2	-0.2	-0.2
Tulare Lake	3,876.3	0.0	0.0	-0.3	3,879.4	-1.0	-1.0	-1.1	3,842.7	0.1	0.1	0.1
San Felipe	68.0	0.0	0.0	0.0	70.0	0.0	0.0	0.0	44.0	0.0	0.0	0.0
California Total	10,172.0	-0.5	-0.4	-38.8	10,181.2	-3.6	-3.6	-28.9	10,080.8	0.3	0.3	0.3

TABLE 15

NET REVENUE CHANGES BY REGION (Million $)

Cause of Net Revenue Change	Compared to Average Year PA			Compared to Wet Year PA			Compared to Dry Year PA		
	Average followed by Average	Wet followed by Average	Dry followed by Average	Average followed by Wet	Wet followed by Wet	Dry followed by Wet	Average followed by Dry	Wet followed by Dry	Dry followed by Dry
Sacramento River									
Fallowed Land	-0.1	0.0	-6.7	-0.3	-0.3	-4.6	0.0	0.0	0.0
Groundwater Pumping Cost	-0.3	-0.3	-0.4	1.0	1.0	-4.5	-0.2	-0.2	-0.2
Irrigation Cost	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
CVP Water Cost	-0.3	1.7	3.6	-5.1	-1.0	4.6	-0.1	-0.1	-0.7
Higher Crop Prices	0.0	0.0	1.9	0.1	0.1	1.0	0.0	0.0	0.0
Net Change	**-1.0**	**1.0**	**-1.9**	**-4.6**	**-0.5**	**-3.8**	**-0.6**	**-0.6**	**-1.2**
San Joaquin River									
Fallowed Land	0.0	0.0	-0.1	-0.2	-0.2	-0.2	0.0	0.0	0.0
Groundwater Pumping Cost	0.0	0.0	-10.3	-7.4	0.2	-14.1	-1.0	-1.0	-1.0
Irrigation Cost	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
CVP Water Cost	1.0	4.0	2.3	7.9	6.1	6.2	-5.9	-5.9	-7.5
Higher Crop Prices	0.1	0.0	2.5	0.2	0.2	1.0	0.0	0.0	0.0
Net Change	**0.9**	**3.9**	**-5.7**	**0.4**	**6.1**	**-7.3**	**-7.0**	**-7.0**	**-8.6**
Tulare Lake									
Fallowed Land	0.0	0.0	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0
Groundwater Pumping Cost	0.1	0.1	0.1	1.0	1.0	1.0	-3.2	-3.2	-3.2
Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CVP Water Cost	-2.3	-1.2	-5.7	-3.1	-2.1	-6.4	-0.9	-0.9	-2.3
Higher Crop Prices	0.0	0.0	1.4	0.1	0.1	0.4	0.0	0.0	0.0
Net Change	**-2.1**	**-1.1**	**-4.2**	**-2.1**	**-1.1**	**-5.1**	**-4.1**	**-4.1**	**-5.5**
San Felipe									
Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Groundwater Pumping Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CVP Water Cost	-0.2	0.0	-0.6	-0.5	-0.2	-0.9	0.0	0.0	-0.1
Higher Crop Prices	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Change	**-0.2**	**0.0**	**-0.6**	**-0.5**	**-0.2**	**-0.9**	**0.0**	**0.0**	**-0.1**
Total									
Fallowed Land	-0.1	-0.1	-6.9	-0.6	-0.6	-4.9	0.0	0.0	0.0
Groundwater Pumping Cost	-0.2	-0.2	-10.5	-5.3	2.2	-17.6	-4.4	-4.4	-4.4
Irrigation Cost	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
CVP Water Cost	-1.6	4.5	0.2	-0.3	3.1	4.5	-6.9	-6.8	-10.5
Higher Crop Prices	0.1	0.1	5.8	0.4	0.4	2.3	0.0	0.0	0.0
Net Change	**-2.3**	**3.7**	**-11.9**	**-6.3**	**4.6**	**-16.1**	**-11.7**	**-11.7**	**-15.3**

Note: A negative value in a cost category represents an increase in cost that produces a decrease in net revenue

TABLE 16
IRRIGATION WATER APPLIED BY REGION (1000 AF)

Region	Average Preferred Alternative	Change Compared to Average PA followed by Average: Average	Wet	Dry	Wet Preferred Alternative	Change Compared to Wet PA followed by Wet: Average	Wet	Dry	Dry Preferred Alternative	Change Compared to Dry PA followed by Dry: Average	Wet	Dry
Sacramento River												
CVP Water*	625.9	-27.6	-23.4	-243.5	694.3	-2.4	-2.6	-305.5	402.1	-20.3	-20.3	-20.4
Groundwater	2,621.3	10.5	10.7	11.2	2,456.9	-24.5	-24.3	114.7	3,261.6	4.1	4.2	4.0
San Joaquin River												
CVP Water*	960.2	-8.7	-9.0	-269.0	1,226.6	-226.3	-21.0	-378.7	506	-17.5	-17.5	-17.5
Groundwater	3,606.2	3.3	3.5	260.0	2,974.2	215.1	10.3	366.8	4723	12.0	12.0	12.0
Tulare Lake												
CVP Water*	919.5	1.9	2.0	2.0	967.3	3.7	3.8	3.6	685.3	0.1	0.1	0.0
Groundwater	3,369.0	-1.8	-2.0	-2.0	2,683.5	-7.7	-7.7	-7.5	4,542.9	0.0	0.0	0.0
San Felipe												
CVP Water*	71.0	0.0	0.0	0.0	71.0	0.0	0.0	0.0	71.0	0.0	0.0	0.0
Groundwater	na	na	na	na	na	na	na	na	na	na	na	na
Total												
CVP Water*	2,505.5	-34.4	-30.4	-510.5	2,888.2	-224.9	-19.9	-680.6	1,593.9	-37.7	-37.8	-37.8
Groundwater	9,596.5	11.9	12.3	269.2	8,114.6	182.8	-21.6	474.0	12,527.1	16.1	16.2	16.1

*CVP water applied is project water only. It excludes exchange contract delivery and the base supply portion of settlement contracts.

TABLE 17 IRRIGATED ACREAGE BY SUBREGION

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA			Preferred Alternative Wet	Changes Compared to Wet PA			Preferred Alternative Dry	Changes Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
1	Pasture	18.3	-1.2	-0.3	-0.1	18.3	-1.5	-1.5	-1.5	18.1	-1.8	-1.8	-1.8
	Alfalfa	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0
	Other Field Crops	1.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0
	Deciduous Orchard	3.8	0.0	0.0	0.0	3.8	0.0	0.0	0.0	3.8	0.0	0.0	0.0
	Small Grain	2.4	0.0	0.0	0.0	2.4	0.0	0.0	0.0	2.4	0.0	0.0	0.0
	Subtotal	**26.6**	**-1.3**	**-0.3**	**-0.1**	**26.5**	**-1.6**	**-1.6**	**-1.6**	**26.3**	**-1.9**	**-1.9**	**-1.9**
2	Pasture	34.1	0.0	0.0	-3.6	33.9	0.0	0.0	-5.9	33.1	0.0	0.0	0.0
	Alfalfa	9.5	0.0	0.0	-0.3	9.5	0.0	0.0	-0.6	9.4	0.0	0.0	0.0
	Sugar Beets	4.0	0.0	0.0	0.0	4.0	0.0	0.0	-0.1	4.0	0.0	0.0	0.0
	Other Field Crops	17.3	0.0	0.0	-0.5	17.2	0.0	0.0	-0.7	17.1	0.0	0.0	0.0
	Rice	4.5	0.0	0.0	-0.2	4.5	0.0	0.0	-0.3	4.5	0.0	0.0	0.0
	Truck Crops	15.5	0.0	0.0	0.0	15.5	0.0	0.0	0.0	15.5	0.0	0.0	0.0
	Deciduous Orchard	86.0	0.0	0.0	-0.1	86.0	0.0	0.0	0.0	86.0	0.0	0.0	0.0
	Small Grain	14.0	0.0	0.0	-0.2	13.9	0.0	0.0	-0.6	13.7	0.0	0.0	0.0
	Subtropical Orchard	10.2	0.0	0.0	0.0	10.2	0.0	0.0	0.0	10.2	0.0	0.0	0.0
	Subtotal	**195.0**	**0.0**	**0.0**	**-4.9**	**194.7**	**0.0**	**0.0**	**-8.2**	**193.5**	**0.0**	**0.0**	**0.0**
3	Pasture	7.8	0.0	0.0	0.0	7.9	0.0	0.0	0.0	7.5	0.0	0.0	0.0
	Alfalfa	18.2	0.0	0.0	0.0	18.3	0.0	0.0	0.0	18.0	0.0	0.0	0.0
	Sugar Beets	9.9	0.0	0.0	0.0	9.9	0.0	0.0	0.0	9.8	0.0	0.0	0.0
	Other Field Crops	15.7	0.0	0.0	0.0	15.8	0.0	0.0	0.0	15.5	0.0	0.0	0.0
	Rice	138.9	0.0	0.0	0.0	139.5	0.0	0.0	0.0	136.7	0.0	0.0	0.0
	Truck Crops	25.2	0.0	0.0	0.0	25.2	0.0	0.0	0.0	25.2	0.0	0.0	0.0
	Tomatoes	25.9	0.0	0.0	0.0	25.9	0.0	0.0	0.0	25.8	0.0	0.0	0.0
	Deciduous Orchard	17.8	0.0	0.0	0.0	17.8	0.0	0.0	0.0	17.8	0.0	0.0	0.0
	Small Grain	30.5	0.0	0.0	0.0	30.6	0.0	0.0	0.0	29.8	0.0	0.0	0.0
	Subtotal	**289.8**	**0.0**	**0.0**	**0.0**	**290.7**	**0.0**	**0.0**	**0.0**	**286.2**	**0.0**	**0.0**	**0.0**
3B	Pasture	5.7	0.0	0.0	-5.7	5.8	0.1	0.1	-1.5	4.3	0.0	0.0	0.0
	Alfalfa	10.1	0.0	0.0	-10.1	10.2	0.1	0.1	-2.6	7.6	0.0	0.0	0.0
	Sugar Beets	5.6	0.0	0.0	-5.3	5.6	0.0	0.0	-2.8	5.1	0.0	0.0	0.0
	Other Field Crops	13.4	0.0	0.0	-13.4	13.5	0.0	0.0	-13.5	10.4	0.0	0.0	0.0
	Rice	9.6	0.0	0.0	-9.6	9.7	0.1	0.1	-9.7	6.2	0.0	0.0	0.0
	Truck Crops	0.6	0.0	0.0	-0.1	0.6	0.0	0.0	0.0	0.6	0.0	0.0	0.0
	Tomatoes	6.1	0.0	0.0	-3.8	6.1	0.0	0.0	-1.8	5.7	0.0	0.0	0.0
	Deciduous Orchard	26.9	0.0	0.0	-3.3	26.9	0.0	0.0	0.0	26.9	0.0	0.0	0.0
	Small Grain	8.5	0.0	0.0	-8.5	8.6	0.0	0.0	-8.6	6.2	0.0	0.0	0.0
	Subtropical Orchard	1.0	0.0	0.0	-0.1	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Subtotal	**87.6**	**0.0**	**0.0**	**-59.9**	**87.9**	**0.3**	**0.3**	**-40.4**	**74.0**	**0.0**	**0.0**	**0.0**

TABLE 17 IRRIGATED ACREAGE BY SUBREGION

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA			Preferred Alternative Wet	Changes Compared to Wet PA			Preferred Alternative Dry	Changes Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
4	Pasture	1.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0	1.1	0.0	0.0	0.0
	Alfalfa	6.8	0.0	0.0	0.0	6.8	0.0	0.0	0.0	6.8	0.0	0.0	0.0
	Sugar Beets	10.3	0.0	0.0	0.0	10.3	0.0	0.0	0.0	10.3	0.0	0.0	0.0
	Other Field Crops	40.1	0.0	0.0	0.0	40.1	0.0	0.0	0.0	39.8	0.0	0.0	0.0
	Rice	87.8	0.0	0.0	0.0	87.9	0.0	0.0	0.0	87.1	0.0	0.0	0.0
	Truck Crops	17.1	0.0	0.0	0.0	17.1	0.0	0.0	0.0	17.1	0.0	0.0	0.0
	Tomatoes	34.1	0.0	0.0	0.0	34.1	0.0	0.0	0.0	34.0	0.0	0.0	0.0
	Deciduous Orchard	30.6	0.0	0.0	0.0	30.6	0.0	0.0	0.0	30.6	0.0	0.0	0.0
	Small Grain	47.5	0.0	0.0	0.0	47.6	0.0	0.0	0.0	46.8	0.0	0.0	0.0
	Subtotal	**275.3**	**0.0**	**0.0**	**0.0**	**275.7**	**0.0**	**0.0**	**-0.1**	**273.6**	**0.0**	**0.0**	**0.0**
5	Pasture	21.4	0.0	0.0	0.0	21.5	0.0	0.0	0.0	21.0	0.0	0.0	0.0
	Alfalfa	4.7	0.0	0.0	0.0	4.7	0.0	0.0	0.0	4.7	0.0	0.0	0.0
	Sugar Beets	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0
	Other Field Crops	15.4	0.0	0.0	0.0	15.4	0.0	0.0	0.0	15.4	0.0	0.0	0.0
	Rice	166.0	0.0	0.0	0.0	166.6	-0.1	-0.1	-0.1	165.2	-0.1	-0.1	-0.1
	Truck Crops	6.6	0.0	0.0	0.0	6.6	0.0	0.0	0.0	6.6	0.0	0.0	0.0
	Tomatoes	1.6	0.0	0.0	0.0	1.6	0.0	0.0	0.0	1.6	0.0	0.0	0.0
	Deciduous Orchard	121.6	0.0	0.0	0.0	121.6	0.0	0.0	0.0	121.6	0.0	0.0	0.0
	Small Grain	22.3	0.0	0.0	0.0	22.4	0.0	0.0	0.0	21.9	0.0	0.0	0.0
	Subtropical Orchard	2.5	0.0	0.0	0.0	2.5	0.0	0.0	0.0	2.5	0.0	0.0	0.0
	Subtotal	**364.1**	**0.0**	**0.0**	**0.0**	**364.9**	**-0.2**	**-0.2**	**-0.1**	**362.4**	**-0.2**	**-0.2**	**-0.2**
6	Pasture	12.1	0.0	0.0	0.0	12.5	-0.4	-0.4	-0.4	11.8	0.0	0.0	0.0
	Alfalfa	28.7	0.0	0.0	0.1	29.0	-0.3	-0.3	-0.3	28.6	0.0	0.0	0.0
	Sugar Beets	21.2	0.0	0.0	0.0	21.2	-0.1	-0.1	-0.1	21.1	0.0	0.0	0.0
	Other Field Crops	59.4	0.0	0.0	0.0	59.9	-0.5	-0.5	-0.5	59.1	0.0	0.0	0.0
	Rice	12.9	0.0	0.0	0.0	13.1	-0.2	-0.2	-0.2	12.8	0.0	0.0	0.0
	Truck Crops	3.4	0.0	0.0	0.0	3.4	0.0	0.0	0.0	3.4	0.0	0.0	0.0
	Tomatoes	45.8	0.0	0.0	0.0	45.9	-0.1	-0.1	-0.1	45.7	0.0	0.0	0.0
	Deciduous Orchard	24.6	0.0	0.0	0.0	24.6	0.0	0.0	0.0	24.6	0.0	0.0	0.0
	Small Grain	64.3	0.0	0.0	0.0	64.6	-0.4	-0.4	-0.4	63.3	0.2	0.2	0.2
	Grapes	8.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0
	Subtotal	**280.2**	**0.0**	**0.0**	**0.0**	**282.2**	**-1.9**	**-1.9**	**-1.8**	**278.4**	**0.2**	**0.2**	**0.2**
7	Pasture	14.5	0.0	0.0	0.0	14.5	0.0	0.0	0.0	14.2	0.0	0.0	0.0
	Alfalfa	3.1	0.0	0.0	0.0	3.1	0.0	0.0	0.0	3.1	0.0	0.0	0.0
	Sugar Beets	2.5	0.0	0.0	0.0	2.5	0.0	0.0	0.0	2.5	0.0	0.0	0.0
	Other Field Crops	3.8	0.0	0.0	0.0	3.8	0.0	0.0	0.0	3.8	0.0	0.0	0.0
	Rice	48.3	0.0	0.0	0.0	48.3	0.0	0.0	0.0	47.9	0.0	0.0	0.0
	Truck Crops	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0
	Tomatoes	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
	Deciduous Orchard	8.9	0.0	0.0	0.0	8.9	0.0	0.0	0.0	8.9	0.0	0.0	0.0
	Small Grain	9.4	0.0	0.0	0.0	9.3	0.0	0.0	0.0	9.2	0.0	0.0	0.0
	Grapes	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0
	Subtotal	**91.4**	**0.0**	**0.0**	**0.0**	**91.5**	**0.0**	**0.0**	**0.0**	**90.5**	**0.0**	**0.0**	**0.0**

TABLE 17 IRRIGATED ACREAGE BY SUBREGION

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA			Preferred Alternative Wet	Changes Compared to Wet PA			Preferred Alternative Dry	Changes Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
8	Pasture	47.7	0.0	0.0	0.0	47.6	0.0	0.0	0.0	46.9	0.0	0.0	0.0
	Alfalfa	12.3	0.0	0.0	0.0	12.3	0.0	0.0	0.0	12.2	0.0	0.0	0.0
	Sugar Beets	12.8	0.0	0.0	0.0	12.8	0.0	0.0	0.0	12.8	0.0	0.0	0.0
	Other Field Crops	42.7	0.0	0.0	0.0	42.7	0.0	0.0	0.0	42.5	0.0	0.0	0.0
	Rice	4.5	0.0	0.0	0.0	4.5	0.0	0.0	0.0	4.5	0.0	0.0	0.0
	Truck Crops	17.1	0.0	0.0	0.0	17.1	0.0	0.0	0.0	17.1	0.0	0.0	0.0
	Tomatoes	12.9	0.0	0.0	0.0	12.9	0.0	0.0	0.0	12.9	0.0	0.0	0.0
	Deciduous Orchard	46.9	0.0	0.0	0.0	46.9	0.0	0.0	0.0	46.9	0.0	0.0	0.0
	Small Grain	29.0	0.0	0.0	0.0	29.1	0.0	0.0	0.0	28.2	0.0	0.0	0.0
	Grapes	58.9	0.0	0.0	0.0	58.9	0.0	0.0	0.0	58.9	0.0	0.0	0.0
	Subtotal	**284.8**	**0.0**	**0.0**	**0.0**	**284.9**	**0.0**	**0.0**	**0.0**	**282.8**	**0.0**	**0.0**	**0.0**
9	Pasture	24.6	-0.2	-0.2	-0.1	24.6	-0.4	-0.4	-0.4	23.4	0.7	0.7	0.7
	Alfalfa	43.8	-0.1	-0.1	0.0	43.8	-0.2	-0.2	-0.2	43.1	0.4	0.4	0.4
	Sugar Beets	28.6	0.0	0.0	0.0	28.6	-0.1	-0.1	0.0	28.5	0.1	0.1	0.1
	Other Field Crops	114.9	-0.2	-0.2	-0.2	115.0	-0.4	-0.4	-0.4	113.6	0.7	0.7	0.7
	Rice	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0
	Truck Crops	46.0	0.0	0.0	0.0	46.0	0.0	0.0	0.0	46.0	0.0	0.0	0.0
	Tomatoes	42.5	0.0	0.0	0.0	42.5	0.0	0.0	0.0	42.3	0.1	0.1	0.1
	Deciduous Orchard	21.3	0.0	0.0	0.0	21.3	0.0	0.0	0.0	21.3	0.0	0.0	0.0
	Small Grain	96.8	-0.1	-0.1	-0.1	97.5	-0.3	-0.3	-0.3	93.7	1.0	1.0	1.0
	Grapes	5.8	0.0	0.0	0.0	5.8	0.0	0.0	0.0	5.8	0.0	0.0	0.0
	Subtotal	**425.0**	**-0.6**	**-0.6**	**-0.4**	**425.9**	**-1.5**	**-1.5**	**-1.4**	**418.4**	**3.0**	**3.0**	**3.0**
10	Pasture	13.3	0.0	0.0	-0.2	13.3	0.0	0.0	0.0	13.3	0.0	0.0	0.0
	Alfalfa	40.8	0.0	0.0	-0.3	40.9	-0.1	0.0	-0.1	40.8	0.0	0.0	0.0
	Sugar Beets	13.9	0.0	0.0	0.0	13.9	0.0	0.0	0.0	13.9	0.0	0.0	0.0
	Other Field Crops	48.2	0.0	0.0	-0.1	48.2	0.1	0.0	0.0	48.3	0.0	0.0	0.0
	Rice	2.9	0.0	0.0	0.0	2.9	0.0	0.0	0.0	2.9	0.0	0.0	0.0
	Truck Crops	112.9	0.0	0.0	0.0	112.9	0.0	0.0	0.0	113.0	0.0	0.0	0.0
	Tomatoes	40.2	0.0	0.0	0.0	40.2	0.0	0.0	0.0	40.2	0.0	0.0	0.0
	Deciduous Orchard	36.6	0.0	0.0	0.0	36.6	0.0	0.0	0.0	36.6	0.0	0.0	0.0
	Small Grain	14.0	0.0	0.0	0.0	14.0	0.1	0.0	0.1	14.0	0.0	0.0	0.0
	Grapes	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Cotton	103.1	0.0	0.0	-0.5	103.1	-0.1	0.0	-0.1	103.1	0.0	0.0	0.0
	Subtropical Orchard	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Subtotal	**427.1**	**0.0**	**0.0**	**-1.1**	**427.2**	**-0.1**	**0.0**	**-0.1**	**427.1**	**0.0**	**0.0**	**0.0**

TABLE 17 IRRIGATED ACREAGE BY SUBREGION

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA			Preferred Alternative Wet	Changes Compared to Wet PA			Preferred Alternative Dry	Changes Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
11	Pasture	42.9	0.0	0.0	0.0	43.0	0.0	0.0	0.0	42.7	0.0	0.0	0.0
	Alfalfa	8.4	0.0	0.0	0.0	8.4	0.0	0.0	0.0	8.3	0.0	0.0	0.0
	Sugar Beets	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.0
	Other Field Crops	17.8	0.0	0.0	0.0	17.9	0.0	0.0	0.0	17.8	0.0	0.0	0.0
	Rice	4.4	0.0	0.0	0.0	4.4	0.0	0.0	0.0	4.4	0.0	0.0	0.0
	Truck Crops	6.3	0.0	0.0	0.0	6.3	0.0	0.0	0.0	6.3	0.0	0.0	0.0
	Tomatoes	0.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0
	Deciduous Orchard	80.8	0.0	0.0	0.0	80.8	0.0	0.0	0.0	80.8	0.0	0.0	0.0
	Small Grain	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0
	Grapes	10.4	0.0	0.0	0.0	10.4	0.0	0.0	0.0	10.4	0.0	0.0	0.0
	Subtotal	174.0	0.0	0.0	0.0	174.2	0.0	0.0	0.0	173.7	0.0	0.0	0.0
12	Pasture	18.3	0.0	0.0	0.0	18.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0
	Alfalfa	18.2	0.0	0.0	0.0	18.1	0.0	0.0	0.0	18.1	0.0	0.0	0.0
	Sugar Beets	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Other Field Crops	41.2	0.0	0.0	0.0	41.0	0.0	0.0	0.0	41.0	0.0	0.0	0.0
	Truck Crops	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0
	Deciduous Orchard	94.0	0.0	0.0	0.0	94.0	0.0	0.0	0.0	94.0	0.0	0.0	0.0
	Small Grain	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	9.9	0.0	0.0	0.0
	Grapes	14.0	0.0	0.0	0.0	14.0	0.0	0.0	0.0	14.0	0.0	0.0	0.0
	Cotton	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Subtropical Orchard	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Subtotal	200.8	0.0	0.0	0.0	200.2	0.0	0.0	0.0	200.1	0.0	0.0	0.0
13	Pasture	39.6	0.0	0.0	0.0	39.9	-0.2	-0.2	-0.3	39.5	-0.3	-0.3	-0.3
	Alfalfa	41.8	0.0	0.0	0.1	42.1	-0.2	-0.2	-0.2	41.8	-0.2	-0.2	-0.2
	Sugar Beets	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0
	Other Field Crops	54.8	0.0	0.0	0.0	55.0	-0.1	-0.1	-0.2	54.6	-0.1	-0.1	-0.1
	Rice	3.9	0.0	0.0	0.0	3.9	0.0	0.0	0.0	3.9	0.0	0.0	0.0
	Truck Crops	18.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0
	Tomatoes	7.0	0.0	0.0	0.0	7.0	0.0	0.0	0.0	7.0	0.0	0.0	0.0
	Deciduous Orchard	135.0	0.0	0.0	0.0	135.0	0.0	0.0	0.0	135.0	0.0	0.0	0.0
	Small Grain	46.9	0.0	0.0	0.0	47.2	-0.1	-0.1	-0.1	46.4	-0.1	-0.1	-0.1
	Grapes	99.0	0.0	0.0	0.0	99.0	0.0	0.0	0.0	99.0	0.0	0.0	0.0
	Cotton	71.8	0.0	0.0	0.0	72.1	-0.2	-0.2	-0.3	71.6	-0.2	-0.2	-0.2
	Subtropical Orchard	9.9	0.0	0.0	0.0	9.9	0.0	0.0	0.0	9.9	0.0	0.0	0.0
	Subtotal	532.5	0.0	0.0	0.0	534.1	-0.9	-0.9	-1.1	531.6	-0.9	-0.9	-0.9

TABLE 17 IRRIGATED ACREAGE BY SUBREGION

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA			Preferred Alternative Wet	Changes Compared to Wet PA			Preferred Alternative Dry	Changes Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
14	Pasture	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Alfalfa	14.0	0.0	0.0	0.0	14.0	0.0	0.0	0.0	13.4	0.0	0.0	0.0
	Sugar Beets	4.8	0.0	0.0	0.0	4.8	0.0	0.0	0.0	4.8	0.0	0.0	0.0
	Other Field Crops	18.4	0.0	0.0	0.0	18.3	0.0	0.0	0.0	17.9	0.0	0.0	0.0
	Truck Crops	136.4	0.0	0.0	0.0	136.4	0.0	0.0	0.0	136.2	0.0	0.0	0.0
	Tomatoes	77.0	0.0	0.0	0.1	77.0	0.0	0.0	0.0	76.2	0.0	0.0	0.0
	Deciduous Orchard	24.9	0.0	0.0	0.0	24.9	0.0	0.0	0.0	24.9	0.0	0.0	0.0
	Small Grain	10.4	0.0	0.0	0.0	10.4	0.0	0.0	0.0	9.7	0.0	0.0	0.0
	Grapes	7.0	0.0	0.0	0.0	7.0	0.0	0.0	0.0	7.0	0.0	0.0	0.0
	Cotton	206.5	0.0	0.0	-0.1	206.6	0.0	0.0	0.0	198.8	0.0	0.0	0.0
	Subtropical Orchard	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Subtotal	**500.4**	**0.0**	**0.0**	**0.0**	**500.5**	**0.0**	**0.0**	**0.0**	**489.9**	**0.0**	**0.0**	**0.0**
15	Pasture	3.9	0.0	0.0	0.0	3.9	0.0	0.0	0.0	3.7	0.0	0.0	0.0
	Alfalfa	83.1	0.0	0.0	0.2	83.4	0.0	0.0	0.1	80.6	0.0	0.0	0.0
	Sugar Beets	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0
	Other Field Crops	86.0	0.0	0.0	0.0	86.1	0.0	0.0	0.0	84.2	0.0	0.0	0.0
	Rice	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Truck Crops	12.0	0.0	0.0	0.0	12.0	0.0	0.0	0.0	12.0	0.0	0.0	0.0
	Tomatoes	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0
	Deciduous Orchard	38.0	0.0	0.0	0.0	38.0	0.0	0.0	0.0	38.0	0.0	0.0	0.0
	Small Grain	71.0	0.0	0.0	0.0	71.6	0.0	0.0	0.0	67.9	0.0	0.0	0.0
	Grapes	56.0	0.0	0.0	0.0	56.0	0.0	0.0	0.0	56.0	0.0	0.0	0.0
	Cotton	242.1	0.0	0.0	-0.2	242.7	0.0	0.0	-0.1	235.5	0.0	0.0	0.0
	Subtropical Orchard	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Subtotal	**600.1**	**0.0**	**0.0**	**-0.1**	**601.7**	**0.0**	**0.0**	**0.0**	**585.9**	**0.0**	**0.0**	**0.0**
16	Pasture	6.2	0.0	0.0	0.0	6.3	-0.2	-0.2	-0.1	6.1	0.0	0.0	0.0
	Alfalfa	5.1	0.0	0.0	0.0	5.2	-0.1	-0.1	-0.1	5.1	0.0	0.0	0.0
	Other Field Crops	6.1	0.0	0.0	0.0	6.1	-0.1	-0.1	-0.1	6.0	0.0	0.0	0.0
	Truck Crops	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0
	Deciduous Orchard	16.0	0.0	0.0	0.0	16.0	0.0	0.0	0.0	16.0	0.0	0.0	0.0
	Small Grain	4.0	0.0	0.0	0.0	4.1	0.0	0.0	0.0	4.0	0.0	0.0	0.0
	Grapes	55.0	0.0	0.0	0.0	55.0	0.0	0.0	0.0	55.0	0.0	0.0	0.0
	Cotton	5.0	0.0	0.0	0.0	5.1	0.0	0.0	0.0	5.0	0.0	0.0	0.0
	Subtropical Orchard	9.0	0.0	0.0	0.0	9.0	0.0	0.0	0.0	9.0	0.0	0.0	0.0
	Subtotal	**111.4**	**-0.1**	**-0.1**	**0.0**	**111.8**	**-0.4**	**-0.4**	**-0.4**	**111.3**	**-0.1**	**-0.1**	**-0.1**

TABLE 17 IRRIGATED ACREAGE BY SUBREGION

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA			Preferred Alternative Wet	Changes Compared to Wet PA			Preferred Alternative Dry	Changes Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
17	Pasture	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0
	Alfalfa	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0
	Sugar Beets	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Other Field Crops	8.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	7.1	0.0	0.0	0.0
	Truck Crops	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0
	Tomatoes	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Deciduous Orchard	73.0	0.0	0.0	0.0	73.0	0.0	0.0	0.0	73.0	0.0	0.0	0.0
	Small Grain	6.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0
	Grapes	109.0	0.0	0.0	0.0	109.0	0.0	0.0	0.0	109.0	0.0	0.0	0.0
	Cotton	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	8.7	0.0	0.0	0.0
	Subtropical Orchard	35.0	0.0	0.0	0.0	35.0	0.0	0.0	0.0	35.0	0.0	0.0	0.0
	Subtotal	**260.1**	**0.0**	**0.0**	**0.0**	**260.3**	**0.0**	**0.0**	**0.0**	**255.3**	**0.0**	**0.0**	**0.0**
18	Pasture	4.0	0.0	0.0	0.0	4.1	0.0	0.0	0.0	3.7	0.0	0.0	0.0
	Alfalfa	62.2	0.0	0.0	0.1	62.8	-0.3	-0.3	-0.2	59.0	0.0	0.0	0.0
	Sugar Beets	1.9	0.0	0.0	0.0	1.9	0.0	0.0	0.0	1.9	0.0	0.0	0.0
	Other Field Crops	78.1	0.0	0.0	-0.1	78.5	-0.2	-0.2	-0.2	75.3	0.0	0.0	0.0
	Truck Crops	13.0	0.0	0.0	0.0	13.0	0.0	0.0	0.0	13.0	0.0	0.0	0.0
	Tomatoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Deciduous Orchard	69.0	0.0	0.0	0.0	69.0	0.0	0.0	0.0	69.0	0.0	0.0	0.0
	Small Grain	41.0	0.0	0.0	0.0	41.4	-0.1	-0.1	-0.1	38.8	0.1	0.1	0.1
	Grapes	56.0	0.0	0.0	0.0	56.0	0.0	0.0	0.0	56.0	0.0	0.0	0.0
	Cotton	170.3	0.0	0.0	-0.1	171.2	-0.5	-0.5	-0.5	163.7	0.0	0.0	0.1
	Subtropical Orchard	97.0	0.0	0.0	0.0	97.0	0.0	0.0	0.0	97.0	0.0	0.0	0.0
	Subtotal	**592.5**	**0.0**	**0.0**	**-0.1**	**594.9**	**-1.2**	**-1.2**	**-1.2**	**577.2**	**0.1**	**0.1**	**0.1**
19	Pasture	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Alfalfa	25.8	0.0	0.0	0.0	25.9	0.0	0.0	0.0	25.2	0.0	0.0	0.0
	Sugar Beets	4.9	0.0	0.0	0.0	5.0	0.0	0.0	0.0	4.9	0.0	0.0	0.0
	Other Field Crops	6.7	0.0	0.0	0.0	6.7	0.0	0.0	0.0	6.7	0.0	0.0	0.0
	Truck Crops	24.0	0.0	0.0	0.0	24.0	0.0	0.0	0.0	24.0	0.0	0.0	0.0
	Tomatoes	1.7	0.0	0.0	0.0	1.7	0.0	0.0	0.0	1.7	0.0	0.0	0.0
	Deciduous Orchard	50.9	0.0	0.0	0.0	50.9	0.0	0.0	0.0	50.9	0.0	0.0	0.0
	Small Grain	7.6	0.0	0.0	0.0	7.6	0.0	0.0	0.0	7.2	0.0	0.0	0.0
	Grapes	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0
	Cotton	117.9	0.0	0.0	-0.1	117.8	0.0	0.0	0.0	115.1	0.0	0.0	0.0
	Subtropical Orchard	4.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0
	Subtotal	253.6	0.0	0.0	0.0	253.6	0.0	0.0	0.0	249.7	0.0	0.0	0.0

TABLE 17 IRRIGATED ACREAGE BY SUBREGION

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA: Average	Wet	Dry	Preferred Alternative Wet	Changes Compared to Wet PA: Average	Wet	Dry	Preferred Alternative Dry	Changes Compared to Dry PA: Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
20	Pasture	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Alfalfa	12.0	0.0	0.0	0.0	12.1	0.0	0.0	0.0	11.0	0.0	0.0	0.0
	Sugar Beets	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
	Other Field Crops	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	2.9	0.0	0.0	0.0
	Truck Crops	41.0	0.0	0.0	0.0	41.0	0.0	0.0	0.0	40.9	0.0	0.0	0.0
	Tomatoes	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0
	Deciduous Orchard	52.0	0.0	0.0	0.0	52.0	0.0	0.0	0.0	52.0	0.0	0.0	0.0
	Small Grain	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0
	Grapes	33.0	0.0	0.0	0.0	33.0	0.0	0.0	0.0	33.0	0.0	0.0	0.0
	Cotton	33.0	0.0	0.0	0.0	33.1	0.0	0.0	0.0	30.8	0.0	0.0	0.0
	Subtropical Orchard	27.0	0.0	0.0	0.0	27.0	0.0	0.0	0.0	27.0	0.0	0.0	0.0
	Subtotal	202.8	0.0	0.0	0.0	203.0	0.0	0.0	0.0	199.3	0.0	0.0	0.0
21	Pasture	0.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0
	Alfalfa	27.6	0.0	0.0	0.0	27.7	0.0	0.0	0.0	27.3	0.0	0.0	0.0
	Sugar Beets	7.4	0.0	0.0	0.0	7.4	0.0	0.0	0.0	7.4	0.0	0.0	0.0
	Other Field Crops	16.1	0.0	0.0	0.0	16.0	0.0	0.0	0.0	16.0	0.0	0.0	0.0
	Rice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Truck Crops	107.8	0.0	0.0	0.0	107.8	0.0	0.0	0.0	107.8	0.0	0.0	0.0
	Tomatoes	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Deciduous Orchard	25.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0
	Small Grain	1.8	0.0	0.0	0.0	1.9	0.0	0.0	0.0	1.8	0.0	0.0	0.0
	Grapes	36.9	0.0	0.0	0.0	36.9	0.0	0.0	0.0	36.9	0.0	0.0	0.0
	Cotton	120.8	0.0	0.0	-0.1	120.8	0.0	0.0	0.0	119.3	0.0	0.0	0.0
	Subtropical Orchard	14.0	0.0	0.0	0.0	14.0	0.0	0.0	0.0	14.0	0.0	0.0	0.0
	Subtotal	359.2	0.0	0.0	0.0	359.2	0.0	0.0	0.0	357.2	0.0	0.0	0.0

NOTES:
1. All acreage values in thousands.
2. A negative value represents a lower acreage in an alternative than in the Preferred Alternative.
3. Not all 12 crops are grown in all subregions.
4. Subregions 3 and 3B should be added together to get the complete subregion 3. 3B represents the area within this subregion served by the Tehama Colusa Canal.

TABLE 18 VALUE OF PRODUCTION BY SUBREGION (Million $)

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA: Average	Wet	Dry	Preferred Alternative Wet	Changes Compared to Wet PA: Average	Wet	Dry	Preferred Alternative Dry	Changes Compared to Dry PA: Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
1	Pasture	2.7	-0.2	0.0	0.0	2.6	-0.2	-0.2	-0.2	2.6	-0.3	-0.3	-0.3
	Alfalfa	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
	Other Field Crops	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
	Deciduous Orchard	4.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0
	Small Grain	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0
	Subtotal	**8.4**	**-0.2**	**-0.1**	**0.0**	**8.3**	**-0.3**	**-0.3**	**-0.3**	**8.3**	**-0.3**	**-0.3**	**-0.3**
2	Pasture	4.9	0.0	0.0	-0.5	4.9	0.0	0.0	-0.8	4.8	0.0	0.0	0.0
	Alfalfa	5.1	0.0	0.0	-0.2	5.1	0.0	0.0	-0.3	5.0	0.0	0.0	0.0
	Sugar Beets	2.9	0.0	0.0	0.0	2.9	0.0	0.0	0.0	2.9	0.0	0.0	0.0
	Other Field Crops	7.8	0.0	0.0	-0.2	7.8	0.0	0.0	-0.3	7.7	0.0	0.0	0.0
	Rice	3.8	0.0	0.0	-0.1	3.8	0.0	0.0	-0.3	3.8	0.0	0.0	0.0
	Truck Crops	55.1	0.0	0.0	-0.1	55.1	0.0	0.0	-0.1	55.1	0.0	0.0	0.0
	Deciduous Orchard	91.3	0.0	0.0	-0.1	91.3	0.0	0.0	0.0	91.3	0.0	0.0	0.0
	Small Grain	4.0	0.0	0.0	-0.1	3.9	0.0	0.0	-0.2	3.9	0.0	0.0	0.0
	Subtropical Orchard	14.6	0.0	0.0	0.0	14.6	0.0	0.0	0.0	14.6	0.0	0.0	0.0
	Subtotal	**189.5**	**0.0**	**0.0**	**-1.3**	**189.4**	**0.0**	**0.0**	**-2.1**	**189.1**	**0.0**	**0.0**	**0.0**
3	Pasture	1.1	0.0	0.0	0.0	1.1	0.0	0.0	0.0	1.1	0.0	0.0	0.0
	Alfalfa	9.7	0.0	0.0	0.0	9.7	0.0	0.0	0.0	9.6	0.0	0.0	0.0
	Sugar Beets	7.3	0.0	0.0	0.0	7.3	0.0	0.0	0.0	7.2	0.0	0.0	0.0
	Other Field Crops	7.1	0.0	0.0	0.0	7.1	0.0	0.0	0.0	7.0	0.0	0.0	0.0
	Rice	118.1	0.0	0.0	0.0	118.6	0.0	0.0	0.0	116.2	0.0	0.0	0.0
	Truck Crops	89.6	0.0	0.0	0.0	89.6	0.0	0.0	0.0	89.6	0.0	0.0	0.0
	Tomatoes	37.9	0.0	0.0	0.0	38.0	0.0	0.0	0.0	37.9	0.0	0.0	0.0
	Deciduous Orchard	18.9	0.0	0.0	0.0	18.9	0.0	0.0	0.0	18.9	0.0	0.0	0.0
	Small Grain	8.7	0.0	0.0	0.0	8.7	0.0	0.0	0.0	8.5	0.0	0.0	0.0
	Subtotal	**298.4**	**0.0**	**0.0**	**0.0**	**299.0**	**0.0**	**0.0**	**0.0**	**295.9**	**0.0**	**0.0**	**0.0**
3B	Pasture	0.8	0.0	0.0	-0.8	0.8	0.0	0.0	-0.2	0.6	0.0	0.0	0.0
	Alfalfa	5.4	0.0	0.0	-5.4	5.4	0.0	0.0	-1.4	4.1	0.0	0.0	0.0
	Sugar Beets	4.1	0.0	0.0	-3.9	4.1	0.0	0.0	-2.0	3.8	0.0	0.0	0.0
	Other Field Crops	6.1	0.0	0.0	-6.0	6.1	0.0	0.0	-6.1	4.7	0.0	0.0	0.0
	Rice	8.2	0.0	0.0	-8.2	8.2	0.0	0.0	-8.2	5.2	0.0	0.0	0.0
	Truck Crops	2.0	0.0	0.0	-0.2	2.0	0.0	0.0	-0.1	2.0	0.0	0.0	0.0
	Tomatoes	8.9	0.0	0.0	-5.6	8.9	0.0	0.0	-2.7	8.4	0.0	0.0	0.0
	Deciduous Orchard	28.6	0.0	0.0	-3.5	28.6	0.0	0.0	0.0	28.6	0.0	0.0	0.0
	Small Grain	2.4	0.0	0.0	-2.4	2.4	0.0	0.0	-2.4	1.8	0.0	0.0	0.0
	Subtropical Orchard	1.4	0.0	0.0	-0.1	1.4	0.0	0.0	0.0	1.4	0.0	0.0	0.0
	Subtotal	**67.9**	**0.0**	**0.0**	**-36.2**	**68.1**	**0.1**	**0.1**	**-23.1**	**60.5**	**0.0**	**0.0**	**0.0**

TABLE 18 VALUE OF PRODUCTION BY SUBREGION (Million $)

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA			Preferred Alternative Wet	Changes Compared to Wet PA			Preferred Alternative Dry	Changes Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
4	Pasture	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0
	Alfalfa	3.6	0.0	0.0	0.0	3.7	0.0	0.0	0.0	3.6	0.0	0.0	0.0
	Sugar Beets	7.5	0.0	0.0	0.0	7.5	0.0	0.0	0.0	7.5	0.0	0.0	0.0
	Other Field Crops	18.0	0.0	0.0	0.0	18.1	0.0	0.0	0.0	17.9	0.0	0.0	0.0
	Rice	74.6	0.0	0.0	0.0	74.8	0.0	0.0	0.0	74.1	0.0	0.0	0.0
	Truck Crops	60.8	0.0	0.0	0.0	60.8	0.0	0.0	0.0	60.8	0.0	0.0	0.0
	Tomatoes	49.9	0.0	0.0	0.0	49.9	0.0	0.0	0.0	49.9	0.0	0.0	0.0
	Deciduous Orchard	32.5	0.0	0.0	0.0	32.5	0.0	0.0	0.0	32.5	0.0	0.0	0.0
	Small Grain	13.5	0.0	0.0	0.0	13.5	0.0	0.0	0.0	13.3	0.0	0.0	0.0
	Subtotal	**260.7**	**0.0**	**0.0**	**0.0**	**260.9**	**0.0**	**0.0**	**0.0**	**259.7**	**0.0**	**0.0**	**0.0**
5	Pasture	3.1	0.0	0.0	0.0	3.1	0.0	0.0	0.0	3.0	0.0	0.0	0.0
	Alfalfa	2.5	0.0	0.0	0.0	2.5	0.0	0.0	0.0	2.5	0.0	0.0	0.0
	Sugar Beets	1.5	0.0	0.0	0.0	1.5	0.0	0.0	0.0	1.5	0.0	0.0	0.0
	Other Field Crops	6.9	0.0	0.0	0.0	6.9	0.0	0.0	0.0	6.9	0.0	0.0	0.0
	Rice	141.2	0.0	0.0	0.0	141.7	-0.1	-0.1	-0.1	140.5	-0.1	-0.1	-0.1
	Truck Crops	23.5	0.0	0.0	0.0	23.5	0.0	0.0	0.0	23.5	0.0	0.0	0.0
	Tomatoes	2.3	0.0	0.0	0.0	2.3	0.0	0.0	0.0	2.3	0.0	0.0	0.0
	Deciduous Orchard	129.1	0.0	0.0	0.0	129.1	0.0	0.0	0.0	129.1	0.0	0.0	0.0
	Small Grain	6.3	0.0	0.0	0.0	6.3	0.0	0.0	0.0	6.2	0.0	0.0	0.0
	Subtropical Orchard	3.6	0.0	0.0	0.0	3.6	0.0	0.0	0.0	3.6	0.0	0.0	0.0
	Subtotal	**320.0**	**0.0**	**0.0**	**0.0**	**320.5**	**-0.1**	**-0.1**	**-0.1**	**319.1**	**-0.1**	**-0.1**	**-0.1**
6	Pasture	1.7	0.0	0.0	0.0	1.8	-0.1	-0.1	-0.1	1.7	0.0	0.0	0.0
	Alfalfa	16.8	0.0	0.0	0.0	17.0	-0.2	-0.2	-0.2	16.8	0.0	0.0	0.0
	Sugar Beets	16.2	0.0	0.0	0.0	16.3	-0.1	-0.1	0.0	16.2	0.0	0.0	0.0
	Other Field Crops	28.9	0.0	0.0	0.0	29.2	-0.2	-0.2	-0.2	28.8	0.0	0.0	0.0
	Rice	10.6	0.0	0.0	0.0	10.8	-0.2	-0.2	-0.2	10.5	0.0	0.0	0.0
	Truck Crops	14.1	0.0	0.0	0.0	14.1	0.0	0.0	0.0	14.1	0.0	0.0	0.0
	Tomatoes	70.0	0.0	0.0	0.0	70.2	-0.1	-0.1	-0.1	70.0	0.0	0.0	0.0
	Deciduous Orchard	26.2	0.0	0.0	0.0	26.2	0.0	0.0	0.0	26.2	0.0	0.0	0.0
	Small Grain	21.9	0.0	0.0	0.0	22.0	-0.1	-0.1	-0.1	21.5	0.1	0.1	0.1
	Grapes	13.8	0.0	0.0	0.0	13.8	0.0	0.0	0.0	13.8	0.0	0.0	0.0
	Subtotal	**220.3**	**0.0**	**0.0**	**0.0**	**221.2**	**-0.9**	**-0.9**	**-0.9**	**219.6**	**0.0**	**0.0**	**0.0**
7	Pasture	2.1	0.0	0.0	0.0	2.1	0.0	0.0	0.0	2.1	0.0	0.0	0.0
	Alfalfa	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0
	Sugar Beets	1.9	0.0	0.0	0.0	1.9	0.0	0.0	0.0	1.9	0.0	0.0	0.0
	Other Field Crops	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0
	Rice	39.6	0.0	0.0	0.0	39.7	0.0	0.0	0.0	39.3	0.0	0.0	0.0
	Truck Crops	1.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0
	Tomatoes	0.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0
	Deciduous Orchard	9.5	0.0	0.0	0.0	9.5	0.0	0.0	0.0	9.5	0.0	0.0	0.0
	Small Grain	3.2	0.0	0.0	0.0	3.2	0.0	0.0	0.0	3.1	0.0	0.0	0.0
	Grapes	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0
	Subtotal	**62.3**	**0.0**	**0.0**	**0.0**	**62.4**	**0.0**	**0.0**	**0.0**	**61.9**	**0.0**	**0.0**	**0.0**

TABLE 18 VALUE OF PRODUCTION BY SUBREGION (Million $)

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA			Preferred Alternative Wet	Changes Compared to Wet PA			Preferred Alternative Dry	Changes Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
8	Pasture	6.9	0.0	0.0	0.0	6.9	0.0	0.0	0.0	6.8	0.0	0.0	0.0
	Alfalfa	7.2	0.0	0.0	0.0	7.2	0.0	0.0	0.0	7.2	0.0	0.0	0.0
	Sugar Beets	9.8	0.0	0.0	0.0	9.8	0.0	0.0	0.0	9.8	0.0	0.0	0.0
	Other Field Crops	20.8	0.0	0.0	0.0	20.8	0.0	0.0	0.0	20.7	0.0	0.0	0.0
	Rice	3.7	0.0	0.0	0.0	3.7	0.0	0.0	0.0	3.7	0.0	0.0	0.0
	Truck Crops	70.9	0.0	0.0	0.0	70.9	0.0	0.0	0.0	70.9	0.0	0.0	0.0
	Tomatoes	19.8	0.0	0.0	0.0	19.8	0.0	0.0	0.0	19.7	0.0	0.0	0.0
	Deciduous Orchard	49.9	0.0	0.0	0.0	49.9	0.0	0.0	0.0	49.9	0.0	0.0	0.0
	Small Grain	9.2	0.0	0.0	0.0	9.2	0.0	0.0	0.0	8.9	0.0	0.0	0.0
	Grapes	101.7	0.0	0.0	0.0	101.7	0.0	0.0	0.0	101.7	0.0	0.0	0.0
	Subtotal	**299.9**	**0.0**	**0.0**	**0.0**	**300.0**	**0.0**	**0.0**	**0.0**	**299.3**	**0.0**	**0.0**	**0.0**
9	Pasture	3.6	0.0	0.0	0.0	3.6	-0.1	-0.1	-0.1	3.4	0.1	0.1	0.1
	Alfalfa	25.6	-0.1	-0.1	0.0	25.7	-0.1	-0.1	-0.1	25.2	0.2	0.2	0.2
	Sugar Beets	22.0	0.0	0.0	0.0	22.0	0.0	0.0	0.0	21.9	0.1	0.1	0.1
	Other Field Crops	55.9	-0.1	-0.1	-0.1	56.0	-0.2	-0.2	-0.2	55.3	0.3	0.3	0.3
	Rice	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0
	Truck Crops	190.8	0.0	0.0	0.0	190.8	0.0	0.0	0.0	190.6	0.1	0.1	0.1
	Tomatoes	64.9	0.0	0.0	0.0	65.0	-0.1	-0.1	0.0	64.8	0.1	0.1	0.1
	Deciduous Orchard	22.7	0.0	0.0	0.0	22.7	0.0	0.0	0.0	22.7	0.0	0.0	0.0
	Small Grain	30.7	0.0	0.0	0.0	30.9	-0.1	-0.1	-0.1	29.7	0.3	0.3	0.3
	Grapes	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0
	Subtotal	**426.8**	**-0.3**	**-0.3**	**-0.1**	**427.2**	**-0.6**	**-0.6**	**-0.6**	**424.2**	**1.2**	**1.2**	**1.2**
10	Pasture	3.1	0.0	0.0	0.0	3.1	0.0	0.0	0.0	3.1	0.0	0.0	0.0
	Alfalfa	23.6	0.0	0.0	-0.2	23.6	-0.1	0.0	-0.1	23.6	0.0	0.0	0.0
	Sugar Beets	12.2	0.0	0.0	0.0	12.2	0.0	0.0	0.0	12.2	0.0	0.0	0.0
	Other Field Crops	31.0	0.0	0.0	-0.1	31.0	0.0	0.0	0.0	31.0	0.0	0.0	0.0
	Rice	2.3	0.0	0.0	0.0	2.3	0.0	0.0	0.0	2.3	0.0	0.0	0.0
	Truck Crops	718.0	0.0	0.0	0.0	717.9	0.1	0.0	0.1	718.1	0.0	0.0	0.0
	Tomatoes	60.1	0.0	0.0	0.0	60.1	0.0	0.0	0.0	60.1	0.0	0.0	0.0
	Deciduous Orchard	52.4	0.0	0.0	0.0	52.4	0.0	0.0	0.0	52.4	0.0	0.0	0.0
	Small Grain	7.6	0.0	0.0	0.0	7.5	0.1	0.0	0.1	7.6	0.0	0.0	0.0
	Grapes	1.9	0.0	0.0	0.0	1.9	0.0	0.0	0.0	1.9	0.0	0.0	0.0
	Cotton	102.6	0.0	0.0	-0.5	102.7	-0.1	0.0	-0.1	102.6	0.0	0.0	0.0
	Subtropical Orchard	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.0
	Subtotal	**1015.1**	**0.0**	**0.0**	**-0.8**	**1015.1**	**0.0**	**0.0**	**0.0**	**1015.2**	**0.0**	**0.0**	**0.0**

TABLE 18 VALUE OF PRODUCTION BY SUBREGION (Million $)

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA			Preferred Alternative Wet	Changes Compared to Wet PA			Preferred Alternative Dry	Changes Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
11	Pasture	10.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	9.9	0.0	0.0	0.0
	Alfalfa	4.8	0.0	0.0	0.0	4.8	0.0	0.0	0.0	4.8	0.0	0.0	0.0
	Sugar Beets	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0
	Other Field Crops	11.5	0.0	0.0	0.0	11.5	0.0	0.0	0.0	11.4	0.0	0.0	0.0
	Rice	3.5	0.0	0.0	0.0	3.6	0.0	0.0	0.0	3.5	0.0	0.0	0.0
	Truck Crops	40.1	0.0	0.0	0.0	40.1	0.0	0.0	0.0	40.0	0.0	0.0	0.0
	Tomatoes	1.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0
	Deciduous Orchard	115.8	0.0	0.0	0.0	115.8	0.0	0.0	0.0	115.8	0.0	0.0	0.0
	Small Grain	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Grapes	19.4	0.0	0.0	0.0	19.4	0.0	0.0	0.0	19.4	0.0	0.0	0.0
	Subtotal	**207.6**	**0.0**	**0.0**	**0.0**	**207.6**	**0.0**	**0.0**	**0.0**	**207.5**	**0.0**	**0.0**	**0.0**
12	Pasture	4.2	0.0	0.0	0.0	4.2	0.0	0.0	0.0	4.2	0.0	0.0	0.0
	Alfalfa	10.5	0.0	0.0	0.0	10.4	0.0	0.0	0.0	10.5	0.0	0.0	0.0
	Sugar Beets	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Other Field Crops	26.5	0.0	0.0	0.0	26.4	0.0	0.0	0.0	26.3	0.0	0.0	0.0
	Truck Crops	19.1	0.0	0.0	0.0	19.1	0.0	0.0	0.0	19.1	0.0	0.0	0.0
	Deciduous Orchard	134.7	0.0	0.0	0.0	134.7	0.0	0.0	0.0	134.7	0.0	0.0	0.0
	Small Grain	5.4	0.0	0.0	0.0	5.4	0.0	0.0	0.0	5.3	0.0	0.0	0.0
	Grapes	26.2	0.0	0.0	0.0	26.2	0.0	0.0	0.0	26.2	0.0	0.0	0.0
	Cotton	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Subtropical Orchard	3.5	0.0	0.0	0.0	3.5	0.0	0.0	0.0	3.5	0.0	0.0	0.0
	Subtotal	**231.2**	**0.0**	**0.0**	**0.0**	**230.9**	**0.0**	**0.0**	**0.0**	**230.8**	**0.0**	**0.0**	**0.0**
13	Pasture	9.2	0.0	0.0	0.0	9.3	-0.1	-0.1	-0.1	9.2	-0.1	-0.1	-0.1
	Alfalfa	24.2	0.0	0.0	0.0	24.3	-0.1	-0.1	-0.1	24.2	-0.1	-0.1	-0.1
	Sugar Beets	4.4	0.0	0.0	0.0	4.4	0.0	0.0	0.0	4.4	0.0	0.0	0.0
	Other Field Crops	35.2	0.0	0.0	0.0	35.4	-0.1	-0.1	-0.1	35.1	-0.1	-0.1	-0.1
	Rice	3.1	0.0	0.0	0.0	3.1	0.0	0.0	0.0	3.1	0.0	0.0	0.0
	Truck Crops	114.4	0.0	0.0	0.0	114.4	0.0	0.0	0.0	114.4	0.0	0.0	0.0
	Tomatoes	10.5	0.0	0.0	0.0	10.5	0.0	0.0	0.0	10.5	0.0	0.0	0.0
	Deciduous Orchard	193.4	0.0	0.0	0.0	193.4	0.0	0.0	0.0	193.4	0.0	0.0	0.0
	Small Grain	25.3	0.0	0.0	0.0	25.4	0.0	0.0	-0.1	25.0	0.0	0.0	0.0
	Grapes	184.9	0.0	0.0	0.0	184.9	0.0	0.0	0.0	184.9	0.0	0.0	0.0
	Cotton	71.4	0.0	0.0	-0.1	71.8	-0.2	-0.2	-0.3	71.2	-0.2	-0.2	-0.2
	Subtropical Orchard	34.7	0.0	0.0	0.0	34.7	0.0	0.0	0.0	34.7	0.0	0.0	0.0
	Subtotal	**710.6**	**0.0**	**0.0**	**0.0**	**711.5**	**-0.5**	**-0.5**	**-0.7**	**709.9**	**-0.6**	**-0.6**	**-0.6**

TABLE 18 VALUE OF PRODUCTION BY SUBREGION (Million $)

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA: Average	Wet	Dry	Preferred Alternative Wet	Changes Compared to Wet PA: Average	Wet	Dry	Preferred Alternative Dry	Changes Compared to Dry PA: Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
14	Pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Alfalfa	8.6	0.0	0.0	0.0	8.6	0.0	0.0	0.0	8.2	0.0	0.0	0.0
	Sugar Beets	3.9	0.0	0.0	0.0	4.0	0.0	0.0	0.0	3.9	0.0	0.0	0.0
	Other Field Crops	11.0	0.0	0.0	0.0	10.9	0.0	0.0	0.0	10.7	0.0	0.0	0.0
	Truck Crops	817.9	0.0	0.0	0.0	817.8	0.0	0.0	0.0	816.9	0.0	0.0	0.0
	Tomatoes	114.6	0.0	0.0	0.1	114.6	0.0	0.0	0.0	113.3	0.0	0.0	0.0
	Deciduous Orchard	38.5	0.0	0.0	0.0	38.5	0.0	0.0	0.0	38.5	0.0	0.0	0.0
	Small Grain	5.2	0.0	0.0	0.0	5.2	0.0	0.0	0.0	4.9	0.0	0.0	0.0
	Grapes	15.1	0.0	0.0	0.0	15.1	0.0	0.0	0.0	15.1	0.0	0.0	0.0
	Cotton	234.6	0.0	0.0	-0.1	234.7	0.0	0.0	0.0	225.8	0.0	0.0	0.0
	Subtropical Orchard	3.7	0.0	0.0	0.0	3.7	0.0	0.0	0.0	3.7	0.0	0.0	0.0
	Subtotal	1253.1	0.0	0.0	0.0	1253.1	0.0	0.0	0.0	1241.1	0.0	0.0	0.0
15	Pasture	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0
	Alfalfa	51.3	0.0	0.0	0.1	51.4	0.0	0.0	0.0	49.7	0.0	0.0	0.0
	Sugar Beets	4.1	0.0	0.0	0.0	4.1	0.0	0.0	0.0	4.0	0.0	0.0	0.0
	Other Field Crops	51.2	0.0	0.0	0.0	51.3	0.0	0.0	0.0	50.2	0.0	0.0	0.0
	Rice	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Truck Crops	72.0	0.0	0.0	0.0	72.0	0.0	0.0	0.0	71.9	0.0	0.0	0.0
	Tomatoes	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0
	Deciduous Orchard	58.7	0.0	0.0	0.0	58.7	0.0	0.0	0.0	58.7	0.0	0.0	0.0
	Small Grain	41.6	0.0	0.0	0.0	41.9	0.0	0.0	0.0	39.7	0.0	0.0	0.0
	Grapes	121.7	0.0	0.0	0.0	121.7	0.0	0.0	0.0	121.7	0.0	0.0	0.0
	Cotton	275.0	0.0	0.0	-0.2	275.7	0.0	0.0	-0.1	267.5	0.0	0.0	0.0
	Subtropical Orchard	3.7	0.0	0.0	0.0	3.7	0.0	0.0	0.0	3.7	0.0	0.0	0.0
	Subtotal	683.2	0.0	0.0	-0.1	684.5	0.0	0.0	0.0	671.1	0.0	0.0	0.0
16	Pasture	1.4	0.0	0.0	0.0	1.5	0.0	0.0	0.0	1.4	0.0	0.0	0.0
	Alfalfa	3.1	0.0	0.0	0.0	3.2	0.0	0.0	0.0	3.1	0.0	0.0	0.0
	Other Field Crops	3.6	0.0	0.0	0.0	3.6	0.0	0.0	0.0	3.6	0.0	0.0	0.0
	Truck Crops	30.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0
	Deciduous Orchard	24.7	0.0	0.0	0.0	24.7	0.0	0.0	0.0	24.7	0.0	0.0	0.0
	Small Grain	2.4	0.0	0.0	0.0	2.4	0.0	0.0	0.0	2.3	0.0	0.0	0.0
	Grapes	119.6	0.0	0.0	0.0	119.6	0.0	0.0	0.0	119.6	0.0	0.0	0.0
	Cotton	5.7	0.0	0.0	0.0	5.8	-0.1	-0.1	-0.1	5.7	0.0	0.0	0.0
	Subtropical Orchard	33.7	0.0	0.0	0.0	33.7	0.0	0.0	0.0	33.7	0.0	0.0	0.0
	Subtotal	224.3	0.0	0.0	0.0	224.5	-0.2	-0.2	-0.2	224.2	0.0	0.0	0.0

TABLE 18 VALUE OF PRODUCTION BY SUBREGION (Million $)

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA			Preferred Alternative Wet	Changes Compared to Wet PA			Preferred Alternative Dry	Changes Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
17	Pasture	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.5	0.0	0.0	0.0
	Alfalfa	3.1	0.0	0.0	0.0	3.1	0.0	0.0	0.0	2.5	0.0	0.0	0.0
	Sugar Beets	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Other Field Crops	4.8	0.0	0.0	0.0	4.8	0.0	0.0	0.0	4.2	0.0	0.0	0.0
	Truck Crops	60.0	0.0	0.0	0.0	60.0	0.0	0.0	0.0	59.7	0.0	0.0	0.0
	Tomatoes	1.5	0.0	0.0	0.0	1.5	0.0	0.0	0.0	1.4	0.0	0.0	0.0
	Deciduous Orchard	112.8	0.0	0.0	0.0	112.8	0.0	0.0	0.0	112.8	0.0	0.0	0.0
	Small Grain	3.5	0.0	0.0	0.0	3.5	0.0	0.0	0.0	3.1	0.0	0.0	0.0
	Grapes	236.9	0.0	0.0	0.0	236.9	0.0	0.0	0.0	236.9	0.0	0.0	0.0
	Cotton	11.4	0.0	0.0	0.0	11.4	0.0	0.0	0.0	9.9	0.0	0.0	0.0
	Subtropical Orchard	131.0	0.0	0.0	0.0	131.0	0.0	0.0	0.0	131.0	0.0	0.0	0.0
	Subtotal	**565.7**	**0.0**	**0.0**	**0.0**	**565.7**	**0.0**	**0.0**	**0.0**	**562.0**	**0.0**	**0.0**	**0.0**
18	Pasture	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.8	0.0	0.0	0.0
	Alfalfa	38.4	0.0	0.0	0.1	38.7	-0.2	-0.2	-0.2	36.4	0.0	0.0	0.0
	Sugar Beets	1.6	0.0	0.0	0.0	1.6	0.0	0.0	0.0	1.5	0.0	0.0	0.0
	Other Field Crops	46.5	0.0	0.0	0.0	46.7	-0.1	-0.1	-0.1	44.8	0.0	0.0	0.0
	Truck Crops	78.0	0.0	0.0	0.0	78.0	0.0	0.0	0.0	77.9	0.0	0.0	0.0
	Tomatoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Deciduous Orchard	106.6	0.0	0.0	0.0	106.6	0.0	0.0	0.0	106.6	0.0	0.0	0.0
	Small Grain	24.0	0.0	0.0	0.0	24.3	-0.1	-0.1	-0.1	22.7	0.1	0.1	0.1
	Grapes	121.7	0.0	0.0	0.0	121.7	0.0	0.0	0.0	121.7	0.0	0.0	0.0
	Cotton	193.5	0.0	0.0	-0.1	194.6	-0.6	-0.6	-0.6	186.0	0.0	0.0	0.0
	Subtropical Orchard	363.1	0.0	0.0	0.0	363.1	0.0	0.0	0.0	363.1	0.0	0.0	0.0
	Subtotal	**974.2**	**0.0**	**0.0**	**-0.1**	**976.1**	**-1.0**	**-1.0**	**-1.0**	**961.5**	**0.1**	**0.1**	**0.1**
19	Pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Alfalfa	15.7	0.0	0.0	0.0	15.7	0.0	0.0	0.0	15.3	0.0	0.0	0.0
	Sugar Beets	4.3	0.0	0.0	0.0	4.3	0.0	0.0	0.0	4.2	0.0	0.0	0.0
	Other Field Crops	4.5	0.0	0.0	0.0	4.5	0.0	0.0	0.0	4.5	0.0	0.0	0.0
	Truck Crops	147.1	0.0	0.0	0.0	147.0	0.0	0.0	0.0	147.0	0.0	0.0	0.0
	Tomatoes	2.7	0.0	0.0	0.0	2.7	0.0	0.0	0.0	2.7	0.0	0.0	0.0
	Deciduous Orchard	80.2	0.0	0.0	0.0	80.2	0.0	0.0	0.0	80.2	0.0	0.0	0.0
	Small Grain	3.6	0.0	0.0	0.0	3.6	0.0	0.0	0.0	3.5	0.0	0.0	0.0
	Grapes	33.0	0.0	0.0	0.0	33.0	0.0	0.0	0.0	33.0	0.0	0.0	0.0
	Cotton	125.2	0.0	0.0	-0.1	125.1	0.0	0.0	0.0	122.2	0.0	0.0	0.0
	Subtropical Orchard	17.1	0.0	0.0	0.0	17.1	0.0	0.0	0.0	17.1	0.0	0.0	0.0
	Subtotal	**433.3**	**0.0**	**0.0**	**0.0**	**433.3**	**0.0**	**0.0**	**0.0**	**429.7**	**0.0**	**0.0**	**0.0**

TABLE 18 VALUE OF PRODUCTION BY SUBREGION (Million $)

CVPM Subregion	Crop Category	Preferred Alternative Average	Changes Compared to Average PA			Preferred Alternative Wet	Changes Compared to Wet PA			Preferred Alternative Dry	Changes Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
20	Pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Alfalfa	7.3	0.0	0.0	0.0	7.3	0.0	0.0	0.0	6.7	0.0	0.0	0.0
	Sugar Beets	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.0
	Other Field Crops	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0
	Truck Crops	251.6	0.0	0.0	0.0	251.6	0.0	0.0	0.0	251.2	0.0	0.0	0.0
	Tomatoes	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
	Deciduous Orchard	81.8	0.0	0.0	0.0	81.8	0.0	0.0	0.0	81.8	0.0	0.0	0.0
	Small Grain	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.4	0.0	0.0	0.0
	Grapes	109.1	0.0	0.0	0.0	109.1	0.0	0.0	0.0	109.1	0.0	0.0	0.0
	Cotton	35.0	0.0	0.0	0.0	35.2	0.0	0.0	0.0	32.7	0.0	0.0	0.0
	Subtropical Orchard	115.6	0.0	0.0	0.0	115.6	0.0	0.0	0.0	115.6	0.0	0.0	0.0
	Subtotal	**603.9**	**0.0**	**0.0**	**0.0**	**604.1**	**0.0**	**0.0**	**0.0**	**600.4**	**0.0**	**0.0**	**0.0**
21	Pasture	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0
	Alfalfa	16.8	0.0	0.0	0.0	16.8	0.0	0.0	0.0	16.6	0.0	0.0	0.0
	Sugar Beets	6.4	0.0	0.0	0.0	6.4	0.0	0.0	0.0	6.3	0.0	0.0	0.0
	Other Field Crops	10.8	0.0	0.0	0.0	10.8	0.0	0.0	0.0	10.8	0.0	0.0	0.0
	Rice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Truck Crops	661.4	0.0	0.0	0.0	661.3	0.0	0.0	0.1	661.3	0.0	0.0	0.0
	Tomatoes	1.6	0.0	0.0	0.0	1.6	0.0	0.0	0.0	1.6	0.0	0.0	0.0
	Deciduous Orchard	39.3	0.0	0.0	0.0	39.3	0.0	0.0	0.0	39.3	0.0	0.0	0.0
	Small Grain	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0
	Grapes	122.1	0.0	0.0	0.0	122.1	0.0	0.0	0.0	122.1	0.0	0.0	0.0
	Cotton	128.3	0.0	0.0	-0.1	128.3	0.0	0.0	0.0	126.7	0.0	0.0	0.0
	Subtropical Orchard	59.9	0.0	0.0	0.0	59.9	0.0	0.0	0.0	59.9	0.0	0.0	0.0
	Subtotal	**1047.6**	**0.0**	**0.0**	**0.0**	**1047.6**	**0.0**	**0.0**	**0.0**	**1045.7**	**0.0**	**0.0**	**0.0**

NOTES:
1. All values in millions of 1992 dollars.
2. A negative value represents a lower gross revenue in an alternative than in the Preferred Alternative.
3. Not all 12 crops are grown in all subregions.
4. Subregions 3 and 3B should be added together to get the complete subregion 3. 3B represents the area within this subregion served by the Tehama Colusa Canal

TABLE 19 CHANGES IN NET REVENUE BY SUBREGION (Million $)

CVPM Subregion	Cause of Net Revenue Change	Change Compared to Average PA			Change Compared to Wet PA			Change Compared to Dry PA		
		Average	Wet	Dry	Average	Wet	Dry	Average	Wet	Dry
		Followed By Average			Followed By Wet			Followed By Dry		
1	Fallowed Land	-0.1	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
	Groundwater Pumping Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
	Irrigation Cost	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
	CVP Water Cost	0.3	0.2	0.1	0.4	0.4	0.4	0.4	0.4	0.4
	Higher Crop Prices	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Net Change	**0.1**	**0.0**	**0.0**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**
2	Fallowed Land	0.0	0.0	-0.3	0.0	0.0	-0.4	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	-0.2	0.0	0.1	-0.6	-0.2	0.5	0.0	0.0	-0.1
	Higher Crop Prices	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
	Net Change	**-0.2**	**0.0**	**0.0**	**-0.6**	**-0.2**	**0.1**	**0.0**	**0.0**	**-0.1**
3	Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	0.0	0.0	0.0	-0.2	-0.2	-0.2	-0.3	-0.3	-0.3
	Higher Crop Prices	0.0	0.0	0.3	0.0	0.0	0.2	0.0	0.0	0.0
	Net Change	**0.0**	**0.0**	**0.3**	**-0.2**	**-0.2**	**0.0**	**-0.3**	**-0.3**	**-0.3**
3B	Fallowed Land	0.0	0.0	-6.4	0.0	0.0	-3.8	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	0.0	1.4	1.4	-4.1	0.0	0.0	0.0
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	-0.4	1.4	3.7	-4.7	-1.2	4.2	0.2	0.2	-0.3
	Higher Crop Prices	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Net Change	**-0.4**	**1.4**	**-2.8**	**-3.3**	**0.2**	**-3.7**	**0.2**	**0.2**	**-0.3**
4	Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2
	Higher Crop Prices	0.0	0.0	0.3	0.0	0.0	0.1	0.0	0.0	0.0
	Net Change	**0.0**	**0.0**	**0.3**	**-0.1**	**-0.1**	**0.0**	**-0.2**	**-0.2**	**-0.2**

TABLE 19 CHANGES IN NET REVENUE BY SUBREGION (Million $)

CVPM Subregion	Cause of Net Revenue Change	Change Compared to Average PA			Change Compared to Wet PA			Change Compared to Dry PA		
		Average	Wet	Dry	Average	Wet	Dry	Average	Wet	Dry
		Followed By Average			Followed By Wet			Followed By Dry		
5	Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
	Higher Crop Prices	0.0	0.0	0.3	0.0	0.0	0.1	0.0	0.0	0.0
	Net Change	**-0.3**	**-0.3**	**0.0**	**-0.3**	**-0.3**	**-0.2**	**-0.3**	**-0.3**	**-0.3**
6	Fallowed Land	0.0	0.0	0.0	-0.2	-0.2	-0.2	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	0.0	0.3	0.3	0.3	-0.1	-0.1	-0.1
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Higher Crop Prices	0.0	0.0	0.4	0.0	0.0	0.2	0.0	0.0	0.0
	Net Change	**0.0**	**0.0**	**0.4**	**0.1**	**0.1**	**0.3**	**-0.1**	**-0.1**	**-0.1**
7	Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
	Higher Crop Prices	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0
	Net Change	**-0.1**	**-0.1**	**0.0**	**-0.1**	**-0.1**	**0.0**	**-0.1**	**-0.1**	**-0.1**
8	Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	0.0	0.1	0.1	0.1	-0.1	-0.1	-0.1
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	-0.8	-0.5	-1.6	-2.0	-1.2	-2.8	-0.3	-0.3	-0.4
	Higher Crop Prices	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0
	Net Change	**-0.8**	**-0.5**	**-1.3**	**-1.9**	**-1.0**	**-2.5**	**-0.3**	**-0.3**	**-0.5**
9	Fallowed Land	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.2	0.2	0.2
	Groundwater Pumping Cost	-0.6	-0.6	-0.6	-1.2	-1.2	-1.2	-0.4	-0.4	-0.4
	Irrigation Cost	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
	CVP Water Cost	1.2	1.2	1.2	2.0	2.0	2.0	0.5	0.5	0.5
	Higher Crop Prices	0.0	0.0	0.5	0.0	0.0	0.2	0.0	0.0	0.0
	Net Change	**0.3**	**0.3**	**0.7**	**0.5**	**0.5**	**0.7**	**0.0**	**0.0**	**0.0**

TABLE 19 CHANGES IN NET REVENUE BY SUBREGION (Million $)

CVPM Subregion	Cause of Net Revenue Change	Change Compared to Average PA			Change Compared to Wet PA			Change Compared to Dry PA		
		Average	Wet	Dry	Average	Wet	Dry	Average	Wet	Dry
		Followed By Average			Followed By Wet			Followed By Dry		
10	Fallowed Land	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	-6.8	-8.3	-0.8	-8.6	0.0	0.0	0.0
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	-0.1	0.4	6.3	7.9	0.7	8.1	0.2	0.2	-0.1
	Higher Crop Prices	0.0	0.0	0.4	0.0	0.0	0.2	0.0	0.0	0.0
	Net Change	**-0.1**	**0.4**	**-0.1**	**-0.5**	**0.0**	**-0.3**	**0.2**	**0.2**	**-0.1**
11	Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Higher Crop Prices	0.0	0.0	0.3	0.0	0.0	0.1	0.0	0.0	0.0
	Net Change	**0.0**	**0.0**	**0.3**	**0.0**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**
12	Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Higher Crop Prices	0.0	0.0	0.3	0.0	0.0	0.1	0.0	0.0	0.0
	Net Change	**0.0**	**0.0**	**0.3**	**0.0**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**
13	Fallowed Land	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
	Groundwater Pumping Cost	0.8	0.7	-2.7	1.6	1.6	-4.9	0.2	0.2	0.2
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	-0.8	-0.6	2.1	-1.7	-1.5	4.3	-0.2	-0.2	-0.4
	Higher Crop Prices	0.0	0.0	0.5	0.0	0.0	0.2	0.0	0.0	0.0
	Net Change	**0.0**	**0.1**	**-0.1**	**-0.1**	**0.0**	**-0.5**	**-0.1**	**-0.1**	**-0.3**
14	Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	1.3	3.5	-6.0	1.8	6.4	-5.5	-6.3	-6.3	-7.3
	Higher Crop Prices	0.0	0.0	0.5	0.0	0.0	0.2	0.0	0.0	0.0
	Net Change	**1.3**	**3.5**	**-5.6**	**1.8**	**6.4**	**-5.3**	**-6.3**	**-6.3**	**-7.3**

TABLE 19 CHANGES IN NET REVENUE BY SUBREGION (Million $)

CVPM Subregion	Cause of Net Revenue Change	Change Compared to Average PA			Change Compared to Wet PA			Change Compared to Dry PA		
		Average	Wet	Dry	Average	Wet	Dry	Average	Wet	Dry
		Followed By Average			Followed By Wet			Followed By Dry		
15	Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	0.0	0.3	0.3	0.3	-1.5	-1.5	-1.5
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	-0.3	-0.2	-0.4	-0.2	-0.2	-0.3	-0.4	-0.4	-0.5
	Higher Crop Prices	0.0	0.0	0.4	0.1	0.0	0.2	0.0	0.0	0.0
	Net Change	**-0.3**	**-0.2**	**0.1**	**0.2**	**0.2**	**0.2**	**-1.9**	**-1.9**	**-1.9**
16	Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping Cost	-0.6	-0.6	-0.6	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.5	0.5
	Higher Crop Prices	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	Net Change	**0.0**	**0.0**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0**	**0.0**	**0.0**
17	Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping Cost	0.2	0.2	0.2	0.3	0.3	0.3	0.0	0.0	0.0
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	-0.1	-0.1	-0.3	-0.4	-0.3	-0.5	0.0	0.0	-0.1
	Higher Crop Prices	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
	Net Change	**0.0**	**0.1**	**0.1**	**0.0**	**0.0**	**-0.1**	**0.0**	**0.0**	**-0.1**
18	Fallowed Land	0.0	0.0	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	0.0	0.2	0.2	0.2	0.0	0.0	0.0
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	-1.5	-1.0	-3.3	-2.2	-1.7	-3.9	0.8	0.8	0.0
	Higher Crop Prices	0.0	0.0	0.4	0.0	0.0	0.1	0.0	0.0	0.0
	Net Change	**-1.5**	**-1.0**	**-2.9**	**-2.1**	**-1.6**	**-3.7**	**0.8**	**0.8**	**0.0**
19	Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	0.0	0.2	0.2	0.2	-1.2	-1.2	-1.2
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	-0.5	-0.5	-0.6	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
	Higher Crop Prices	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0
	Net Change	**-0.5**	**-0.5**	**-0.3**	**-0.3**	**-0.3**	**-0.3**	**-1.8**	**-1.8**	**-1.8**

TABLE 19 CHANGES IN NET REVENUE BY SUBREGION (Million $)

CVPM Subregion	Cause of Net Revenue Change	Change Compared to Average PA			Change Compared to Wet PA			Change Compared to Dry PA		
		Average	Wet	Dry	Average	Wet	Dry	Average	Wet	Dry
		Followed By Average			Followed By Wet			Followed By Dry		
20	Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.2
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	-0.1	0.2	-0.9	-0.3	-0.1	-1.1	-0.2	-0.2	-0.5
	Higher Crop Prices	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
	Net Change	**-0.1**	**0.2**	**-0.8**	**-0.3**	**0.0**	**-1.1**	**-0.3**	**-0.3**	**-0.7**
21	Fallowed Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater Pumping Cost	0.0	0.0	0.0	0.2	0.2	0.2	-0.8	-0.8	-0.8
	Irrigation Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CVP Water Cost	0.1	0.3	-0.5	0.2	0.5	-0.4	-0.7	-0.7	-0.9
	Higher Crop Prices	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0
	Net Change	**0.1**	**0.3**	**-0.3**	**0.4**	**0.7**	**-0.1**	**-1.5**	**-1.5**	**-1.7**
Total	Fallowed Land	-0.1	0.0	-6.8	-0.4	-0.3	-4.6	-0.2	-0.2	-0.2
	Groundwater Pumping	0.4	0.4	-9.9	-4.4	3.1	-16.6	-4.0	-4.0	-4.0
	Irrigation Cost	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
	CVP Water Cost	-1.3	4.3	2.3	0.0	2.9	6.5	-8.0	-7.9	-10.7
	Higher Crop Prices	0.1	0.0	4.7	0.4	0.4	1.9	0.0	0.0	0.0
	Net Change	**-1.1**	**4.4**	**-10.0**	**-4.6**	**5.8**	**-13.2**	**-12.4**	**-12.4**	**-15.1**

Notes:
1. All values in millions of 1992 dollars
2. A negative value represents a reduction in net revenue compared to the Preferred Alternative
3. Subregions 3 and 3B should be added together to get the complete subregion 3. 3B represents the area within this subregion served by the Tehama Colusa Canal
4. PA is the Preferred Alternative

TABLE 20 IRRIGATION WATER APPLIED BY SUBREGION

CVPM Subregion	Water Source	Preferred Alternative Average	Changes Compared to Average PA			Preferred Alternative Wet	Changes Compared to Wet PA			Preferred Alternative Dry	Changes Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
1	CVP Water	19.3	-10.8	-6.4	-5.4	20.5	-13.0	-13.0	-13.0	21.0	-13.5	-13.5	-13.5
	Groundwater	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	-1.5	-1.5	-1.5
2	CVP Water	27.7	0.0	0.0	-21.6	37.1	0.0	0.1	-36.7	8.2	0.0	0.0	0.0
	Groundwater	512.1	0.0	0.0	0.0	506.4	0.0	-0.1	0.0	584.7	0.0	0.0	0.0
3	CVP Water	170.4	0.0	0.0	0.0	174.2	0.0	0.0	0.0	154.3	0.0	0.0	0.0
	Groundwater	248.9	0.0	0.0	0.0	227.0	0.0	0.0	0.0	355.3	0.0	0.0	0.0
3B	CVP Water	199.6	0.1	0.0	-199.6	227.0	39.3	39.1	-227.0	50.3	0.0	0.0	-0.1
	Groundwater	78.7	-0.1	0.0	0.0	50.4	-38.4	-38.2	99.6	191.9	0.0	0.0	0.0
4	CVP Water	129.8	0.0	0.0	0.0	133.1	0.0	0.0	0.0	113.9	0.0	0.0	0.0
	Groundwater	326.6	0.0	0.0	0.0	305.1	0.0	0.0	0.0	442.8	0.0	0.0	0.0
5	CVP Water	19.9	0.1	0.0	0.1	20.8	0.1	0.0	0.0	17.9	0.0	-0.1	0.0
	Groundwater	492.6	-0.1	0.0	-0.1	449.3	-1.1	-1.0	-0.4	588.7	-1.1	-1.0	-1.1
6	CVP Water	2.2	0.0	0.0	0.0	2.4	0.0	0.0	0.0	1.8	0.0	0.0	0.0
	Groundwater	452.8	0.0	0.0	0.0	447.6	-6.4	-6.4	-6.0	521.0	0.0	0.0	0.0
7	CVP Water	22.0	0.0	0.0	0.0	22.6	0.0	0.0	0.0	19.1	0.0	0.0	0.0
	Groundwater	193.2	0.0	0.0	0.0	177.9	0.0	0.0	0.0	217.5	0.0	0.0	0.0
8	CVP Water	51.6	0.1	0.0	-0.1	79.4	0.1	-0.1	-0.1	25.3	0.0	0.0	-0.1
	Groundwater	756.4	-0.1	0.0	0.1	717.3	0.0	0.0	0.0	851.3	-0.2	-0.2	-0.1
9	CVP Water	28.2	-28.2	-28.2	-28.2	48.1	-48.1	-48.1	-48.1	11.5	-11.5	-11.5	-11.5
	Groundwater	80.3	17.9	17.9	18.7	70.2	35.6	35.6	36.0	100.1	11.5	11.5	11.4
10	CVP Water	183.4	0.0	0.0	-183.4	234.4	-228.4	-22.8	-234.4	92.1	0.0	0.0	0.0
	Groundwater	496.2	0.0	0.0	179.4	414.4	227.7	22.7	233.7	632.4	0.0	0.0	-0.1
11	CVP Water	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater	34.1	0.0	0.0	0.0	26.8	0.0	0.0	0.0	34.5	0.0	0.0	0.0
12	CVP Water	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Groundwater	173.1	0.0	0.0	0.0	141.8	0.0	0.0	0.0	228.2	0.0	0.0	0.0
13	CVP Water	163.6	16.7	16.6	-60.2	159.0	33.2	33.1	-113.1	128.2	0.0	0.0	0.0
	Groundwater	912.5	-16.7	-16.6	60.2	812.0	-36.2	-36.2	109.1	1,181.4	-3.8	-3.8	-3.8
14	CVP Water	524.4	0.1	0.0	0.1	719.0	0.1	0.0	0.0	230.2	0.0	0.0	0.0
	Groundwater	826.3	-0.1	0.0	-0.1	603.6	-0.1	0.0	0.0	1,176.4	0.0	0.0	0.0

TABLE 20 IRRIGATION WATER APPLIED BY SUBREGION

CVPM Subregion	Water Source	Preferred Alternative Average	Changes Compared to Average PA			Preferred Alternative Wet	Changes Compared to Wet PA			Preferred Alternative Dry	Changes Compared to Dry PA		
			Average	Wet	Dry		Average	Wet	Dry		Average	Wet	Dry
			Followed by Average				Followed by Wet				Followed by Dry		
15	CVP Water	35.1	0.0	0.1	0.1	38.1	0.0	0.1	0.0	28.6	0.0	0.0	0.0
	Groundwater	1,276.6	0.0	-0.1	-0.1	1,099.1	0.0	0.0	0.0	1,600.7	0.0	0.0	0.0
16	CVP Water	16.2	-16.2	-16.2	-16.2	15.7	-15.7	-15.7	-15.7	12.9	-12.9	-12.9	-12.9
	Groundwater	49.6	14.9	14.8	15.0	0.0	13.2	13.2	13.2	107.3	11.5	11.5	11.5
17	CVP Water	34.6	3.9	3.8	4.0	32.5	7.4	7.3	7.4	27.1	0.0	0.0	0.1
	Groundwater	415.1	-3.8	-3.8	-3.9	303.2	-7.4	-7.2	-7.4	577.4	0.0	0.0	0.0
18	CVP Water	517.3	0.0	0.0	0.1	526.3	0.0	0.0	0.1	399.0	0.0	0.0	0.1
	Groundwater	1,018.0	0.0	0.0	-0.1	821.8	-4.0	-4.0	-3.8	1,334.9	0.0	0.0	0.0
19	CVP Water	13.3	-0.1	0.0	0.1	15.4	-0.1	-0.1	0.0	9.4	0.0	0.0	0.0
	Groundwater	366.8	0.1	0.0	-0.1	250.7	0.0	0.0	0.0	578.4	0.0	0.0	0.0
20	CVP Water	208.7	0.1	0.1	-0.2	219.8	0.1	0.1	-0.1	154.1	0.0	0.0	-0.1
	Groundwater	303.6	-0.1	-0.1	0.1	244.8	0.0	0.0	0.0	437.3	0.0	0.0	0.0
21	CVP Water	138.3	0.0	0.0	-0.1	163.0	0.0	0.1	-0.1	89.3	0.0	0.0	-0.1
	Groundwater	579.4	0.0	0.0	0.1	445.2	0.0	-0.1	0.0	783.1	0.0	0.0	0.0
Total	CVP Water	2,505.5	-34.4	-30.4	-510.5	2,888.2	-224.9	-19.8	-680.6	1,593.9	-37.7	-37.8	-37.8
	Groundwater	9,596.5	11.9	12.3	269.2	8,114.6	182.8	-21.6	474.0	12,527.1	16.1	16.2	16.1

Notes:
1. All quantities in thousands of acre-feet
2. A negative value represents a lower quantitity than in the Preferred Alternative
3. Subregions 3 and 3B should be added together to get the complete subregion 3. 3B represents the area within this subregion served by the Tehama Colusa Canal
4. PA is the Preferred Alternative

TABLE 21 SUBREGION ANALYSIS OF SIGNIFICANT CHANGES IN WATER USE

Subregion	Outcome	Explanation
1	Decrease in CVP use and no GW substitution in all sequences	Less CVP water is used than in the Preferred Alternative because the blended price is 140% to 330% higher than the Preferred Alternative Tier 1 (the only tier of water that was used for this scenario). For hydrologic reasons, subregion 1 is restricted from switching to groundwater.
2	Decrease in CVP use and no GW substitution in Dry to Average and Dry to Wet sequences	Less CVP water is used than in the Preferred Alternative because the blended prices for the Dry to Average and Dry to Wet sequences are 320% and 345% higher than the Preferred Alternative Tier 1 price (the only water tier that was used for this scenario). For hydrologic reasons, subregion 2 is restricted from switching to groundwater.
3B	Decrease CVP and no GW substitution in Dry to Average sequence	Less CVP water is used than in the Preferred Alternative because the blended price is 240% higher than the Tier 1 price from the Preferred Alternative, which is the only tier of water that was used. For hydrologic reasons the region is restricted from switching to groundwater in this long-run scenario.
3B	Decrease in CVP use and GW substitution in Dry to Wet sequence	CVP water use decreases because the blended price is 260% higher than the Preferred Alternative Tier 1 price. The model allowed a shift to groundwater on a short run basis to provide water to permanent crops during the wet year when groundwater would have been recharged.
3B	Shift from Groundwater to CVP water in Average to Wet and Wet to Wet sequences	In the Preferred Alternative wet year analysis subregion 3B has 39 TAF of water that falls in Tiers 2 or 3. Under the LTCR blended pricing mechanism all of the subregions CVP water is prices at a level that is lower than the Preferred Alternative Tier 2. This additional affordable CVP water is used resulting in a less groundwater being pumped.
9	Shift from CVP to Groundwater in all sequences	The blended price of CVP water in subregion 9 is greater than the groundwater pumping cost resulting in the shift from CVP to groundwater.
10	Shift from CVP to Groundwater in Dry to Average and Average, Wet and Dry to Wet sequences	Due to an increase in the CVP price relative to the Preferred Alternative, the depth to which groundwater can be affordable pumped increases resulting in the shift from CVP supplies to groundwater.
13	Shift from groundwater to CVP in Average to Average, Wet to Average, Average to Wet and Wet to Wet sequences	In the Preferred Alternative Average and Wet conditions subregion 13 had water classified as Tier 2 or Tier 3 which was not affordable, and pumped groundwater to supplement it's Tier 1 supply down to a depth at which it was no longer affordable. In the LTCR sequences, the blended price is less expensive than the Preferred Alternative upper Tier price, therefor a shift is made from the deepest groundwater to the now affordable CVP supply.

TABLE 21 SUBREGION ANALYSIS OF SIGNIFICANT CHANGES IN WATER USE

Subregion	Outcome	Explanation
13	Shift from CVP to Groundwater in Dry to Average and Dry to Wet sequences	Under the LTCR blended price mechanism, when coming out of a drought into a Average or Wet year the blended price increases. In these situations, shallow groundwater is less expensive than the CVP blended price. As more groundwater is pumped the cost increases as the pump lift increases and the cost eventually becomes greater than the CVP blended price. When this happens the remainder of the subregions water supply is taken from the CVP supplies.
16	Shift from CVP to Groundwater in all sequences	The blended price of CVP water in subregion 16 is greater than the groundwater pumping cost resulting in the shift from CVP to groundwater.
17	Shift from groundwater to CVP	In the Preferred Alternative Average and Wet conditions this subregion had water classified as Tier 2 or Tier 3 which was not affordable. The subregion pumped groundwater down to a depth at which it was no longer affordable to supplement the CVP water is was able to afford. In the LTCR sequences, the blended price is less expensive than the least expensive CVP tier that was not used, therefor a shift is made from the deepest groundwater to the now affordable CVP supply.
19	Shift from CVP to Groundwater in Dry to Dry sequence	The blended pricing causes the Dry to Dry CVP water cost to rise higher than the groundwater pumping cost resulting in the shift from CVP to groundwater.

SECTION 2
REGIONAL ECONOMICS

REGIONAL ECONOMICS

This analysis identifies the regional economic impacts of two out of the nine total Long Term Contract Renewal sequences; an Average year following an Average 5-year base condition, and a Average year following a Dry 5-year base condition. The regional economic analysis is restricted to these sequences because they are the only sequences that represent long-run conditions. The Input-Output model used in the regional economic analysis assumes a long run equilibrium is reached, therefore it is inappropriate to model short run responses represented by the Wet and Dry year conditions. While the Average year following the Dry 5-year base condition is not strictly a long-run scenario, as described in the Agricultural and Land Use and Economics section, there are some regions that will be permanently impacted by a five year series of drought years. Because of this, the results can be considered long run.

The assumptions and baseline data used in this analysis are the same as what was used in the Preferred Alternative. Tables 23 and 24 show the results of the Average year following an Average 5-year base condition, Tables 25 and 26 the Average year following an Wet 5-year base condition, and Tables 27 and 28 the Average year following an Dry 5-year base condition. Tables 23, 25, and 27 present the impacts by economic sectors that are aggregations of SIC industries. Tables 24, 26, and 28 present the regional economic impacts broken out by the source of the impact including reduced agricultural output, changes in net farm income, and changes in M&I water costs. Note that regional economic impacts are not reported for the North Coast or the Central and South Coast regions because the rolling five year average tiered pricing mechanism has no impact on these regions.

AVERAGE YEAR FOLLOWING AVERAGE 5-YEAR BASE CONDITION

Table 23 shows the employment, output and income effects on all sectors in each regional economy of the long-term contract renewals. Most of the impacts are felt in the Manufacturing, Trade and Services sectors. These impacts are derived from the impact to net income. The economic impacts by region from each source can be seen in Table 24. Reduction in net income resulting from changes in CVP water cost, groundwater pumping, irrigation costs and changes in crop prices have the greatest impact at the statewide level.

AVERAGE YEAR FOLLOWING DRY 5-YEAR BASE CONDITION

Table 27 shows the employment, output and income effects for each regional economy and the State as a whole broken out by the impacted sectors. Table 28 shows how each of the impact sources contribute to the total impact. The reduction in agricultural output in the Sacramento River region relative to the Preferred Alternative dominates the Statewide impact.

TABLE 22

REGIONAL ECONOMIC IMPACTS ON ALL SECTORS: AVERAGE YEAR FOLLOWING AVERAGE 5-YEAR BASE CONDITION COMPARED TO THE PREFERRED ALTERNATIVE AVERAGE YEAR CONDITION

	Impacts on all Sectors					
	Employment (# of jobs)		Output ($MM)		PoW Income ($MM)	
Region Directly Impacted	Direct	Total	Direct	Total	Direct	Total
Sacramento River						
Agriculture						
Reduced Output	-10	-20	-0.5	-1.2	-0.2	-0.6
Reduced Net Income	-20	-50	-0.9	-2.3	-0.5	-1.3
Total Agriculture	-30	-60	-1.4	-3.5	-0.7	-1.9
M&I Water Costs	-60	-130	-3.9	-8.5	-2.0	-4.7
TOTAL 1/	**-90**	**-190**	-5.3	-12.0	-2.8	-6.6
San Joaquin River						
Agriculture						
Reduced Output	0	0	-0.2	-0.3	-0.1	-0.2
Reduced Net Income	20	40	0.8	1.8	0.5	1.0
Total Agriculture	20	30	0.7	1.5	0.4	0.9
M&I Water Costs	-80	-150	-5.0	-9.4	-2.6	-5.1
TOTAL 1/	**-60**	**-120**	-4.3	-7.9	-2.2	-4.2
Tulare Lake						
Agriculture						
Reduced Output	0	0	0.0	0.0	0.0	0.0
Reduced Net Income	-50	-80	-2.1	-4.1	-1.1	-2.2
Total Agriculture	-50	-80	-2.1	-4.1	-1.1	-2.2
M&I Water Costs	0	0	0.0	0.0	0.0	0.0
TOTAL 1/	**-50**	**-80**	-2.1	-4.1	-1.1	-2.2
Bay Area						
Agriculture						
Reduced Output	0	0	0.0	0.0	0.0	0.0
Reduced Net Income	0	-10	-0.2	-0.4	-0.1	-0.2
Total Agriculture	0	-10	-0.2	-0.4	-0.1	-0.2
M&I Water Costs	-60	-130	-4.4	-9.4	-2.4	-5.4
TOTAL 1/	**-60**	**-130**	-4.6	-9.8	-2.5	-5.6
California Total						
Agriculture						
Reduced Output	-10	-20	-0.7	-1.5	-0.3	-0.8
Reduced Net Income	-50	-100	-2.3	-5.0	-1.2	-2.7
Total Agriculture	-60	-120	-3.0	-6.5	-1.6	-3.5
M&I Water Costs	-200	-410	-13.3	-27.4	-7.0	-15.1
TOTAL 1/	**-260**	**-530**	**-16.3**	**-33.9**	**-8.6**	**-18.6**

Note: (1) May differ from sum of elements due to rounding.

TABLE 23

REGIONAL ECONOMIC IMPACT: AVERAGE YEAR FOLLOWING AVERAGE 5-YEAR BASE CONDITION COMPARED TO THE PREFERRED ALTERNATIVE AVERAGE YEAR CONDITION

Region and Affected Sector	Employment (# of jobs)		Output ($MM)		PoW Income ($MM)	
	Direct	Total	Direct	Total	Direct	Total
Sacramento River						
Agric., Frst., Fish.	-10	-10	-0.4	-0.5	-0.2	-0.3
Mining	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0.0	-0.2	0.0	-0.1
Manufacturing	-10	-20	-1.6	-2.2	-0.6	-0.8
TCU	0	-10	-0.2	-0.9	-0.1	-0.5
Trade	-40	-70	-1.1	-2.1	-0.7	-1.3
FIRE	-10	-20	-0.8	-2.6	-0.5	-1.7
Services	-20	-60	-0.9	-2.8	-0.6	-1.7
Government	0	-10	-0.2	-0.7	-0.1	-0.3
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	-90	-190	-5.3	-12.0	-2.8	-6.6
San Joaquin River						
Agric., Frst., Fish.	0	-10	-0.2	-0.3	-0.1	-0.1
Mining	0	0	-0.1	-0.1	0.0	0.0
Construction	0	0	0.0	-0.1	0.0	-0.1
Manufacturing	-10	-10	-0.8	-1.1	-0.2	-0.3
TCU	0	-10	-0.3	-0.6	-0.2	-0.3
Trade	-10	-30	-0.4	-1.1	-0.2	-0.6
FIRE	-10	-20	-1.1	-2.1	-0.7	-1.3
Services	-30	-50	-1.2	-2.2	-0.7	-1.3
Government	0	0	-0.2	-0.3	-0.1	-0.1
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	-60	-120	-4.3	-7.9	-2.2	-4.2
Tulare Lake						
Agric., Frst., Fish.	0	0	0.0	0.0	0.0	0.0
Mining	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0.0	0.0	0.0	0.0
Manufacturing	-10	-10	-1.0	-1.3	-0.4	-1.3
TCU	0	0	0.0	-0.2	0.0	-0.2
Trade	-40	-50	-1.0	-1.4	-0.7	-1.4
FIRE	0	0	0.0	-0.4	0.0	-0.4
Services	0	-10	0.0	-0.6	0.0	-0.6
Government	0	0	0.0	-0.1	0.0	-0.1
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	-50	-80	-2.1	-4.1	-1.1	-4.1
Bay Area						
Agric., Frst., Fish.	0	0	0.0	-0.1	0.0	0.0
Mining	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0.0	-0.1	0.0	-0.1
Manufacturing	-10	-10	-1.2	-1.9	-0.4	-0.7
TCU	0	-10	-0.3	-0.8	-0.2	-0.4
Trade	-20	-40	-0.9	-1.7	-0.5	-1.0
FIRE	-10	-20	-1.0	-2.3	-0.6	-1.5
Services	-20	-50	-1.1	-2.6	-0.7	-1.6
Government	0	0	-0.2	-0.3	-0.1	-0.1
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	-60	-130	-4.6	-9.8	-2.5	-5.6
California Total						
Agric., Frst., Fish.	-10	-20	-0.6	-0.9	-0.3	-0.5
Mining	0	0	-0.1	-0.1	0.0	0.0
Construction	0	-10	0.0	-0.5	0.0	-0.3
Manufacturing	-30	-50	-4.7	-6.5	-1.6	-3.1
TCU	-10	-20	-0.8	-2.5	-0.4	-1.4
Trade	-110	-190	-3.4	-6.3	-2.2	-4.4
FIRE	-20	-60	-2.9	-7.4	-1.8	-4.9
Services	-70	-180	-3.2	-8.1	-1.9	-5.2
Government	0	-10	-0.6	-1.4	-0.3	-0.7
Misc	0	0	-0.1	-0.1	-0.1	-0.1
TOTAL/1	-260	-530	-16.3	-33.9	-8.6	-20.5

Note:(1) May differ from sum of elements due to rounding.

Table 24

REGIONAL ECONOMIC IMPACTS ON ALL SECTORS: AVERAGE YEAR FOLLOWING WET 5-YEAR BASE CONDITION COMPARED TO THE PREFERRED ALTERNATIVE AVERAGE YEAR CONDITION

	Impacts on all Sectors					
	Employment (# of jobs)		Output ($MM)		PoW Income ($MM)	
Region Directly Impacted	Direct	Total	Direct	Total	Direct	Total
Sacramento River						
Agriculture						
Reduced Output	0	-10	-0.4	-0.8	-0.2	-0.4
Reduced Net Income	30	50	1.0	2.6	0.5	1.4
Total Agriculture	20	40	0.6	1.8	0.4	1.0
M&I Water Costs	-60	-130	-3.9	-8.5	-2.0	-4.7
TOTAL 1/	**-40**	**-90**	**-3.3**	**-6.7**	**-1.6**	**-3.6**
San Joaquin River						
Agriculture						
Reduced Output	0	0	-0.2	-0.3	-0.1	-0.2
Reduced Net Income	100	170	3.7	8.1	2.1	4.5
Total Agriculture	90	160	3.6	7.8	2.0	4.4
M&I Water Costs	-80	-150	-5.0	-9.4	-2.6	-5.1
TOTAL 1/	**20**	**10**	**-1.4**	**-1.6**	**-0.6**	**-0.7**
Tulare Lake						
Agriculture						
Reduced Output	0	0	0.0	0.0	0.0	0.0
Reduced Net Income	-30	-40	-1.1	-2.1	-0.6	-1.1
Total Agriculture	-30	-40	-1.1	-2.1	-0.6	-1.1
M&I Water Costs	0	0	0.0	0.0	0.0	0.0
TOTAL 1/	**-30**	**-40**	**-1.1**	**-2.1**	**-0.6**	**-1.1**
Bay Area						
Agriculture						
Reduced Output	0	0	0.0	0.0	0.0	0.0
Reduced Net Income	0	0	-0.1	-0.2	0.0	-0.1
Total Agriculture	0	0	-0.1	-0.2	0.0	-0.1
M&I Water Costs	-60	-130	-4.4	-9.4	-2.4	-5.4
TOTAL 1/	**-60**	**-130**	**-4.5**	**-9.6**	**-2.5**	**-5.5**
California Total						
Agriculture						
Reduced Output	0	-10	-0.5	-1.1	-0.2	-0.6
Reduced Net Income	100	180	3.6	8.4	2.0	4.7
Total Agriculture	100	170	3.0	7.3	1.7	4.2
M&I Water Costs	-200	-410	-13.3	-27.4	-7.0	-15.1
TOTAL 1/	**-100**	**-240**	**-10.3**	**-20.1**	**-5.3**	**-11.0**

Note: (1) May differ from sum of elements due to rounding.

TABLE 25

REGIONAL ECONOMIC IMPACT: AVERAGE YEAR FOLLOWING WET 5-YEAR BASE CONDITION COMPARED TO THE PREFERRED ALTERNATIVE AVERAGE YEAR CONDITION

	Employment (# of jobs)		Output ($MM)		PoW Income ($MM)	
Region and Affected Sector	Direct	Total	Direct	Total	Direct	Total
Sacramento River						
Agric., Frst., Fish.	0	-10	-0.2	-0.3	-0.1	-0.2
Mining	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0.0	-0.1	0.0	-0.1
Manufacturing	0	-10	-0.7	-0.9	-0.2	-0.3
TCU	0	0	-0.2	-0.6	-0.1	-0.3
Trade	0	-10	-0.2	-0.7	0.0	-0.3
FIRE	-10	-20	-0.8	-1.8	-0.5	-1.1
Services	-20	-40	-0.9	-1.9	-0.6	-1.1
Government	0	0	-0.2	-0.5	-0.1	-0.2
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	-40	-90	-3.3	-6.7	-1.6	-3.6
San Joaquin River						
Agric., Frst., Fish.	0	0	-0.1	-0.2	-0.1	-0.1
Mining	0	0	-0.1	-0.1	0.0	0.0
Construction	0	0	0.0	-0.1	0.0	0.0
Manufacturing	10	10	0.6	0.8	0.3	0.4
TCU	0	0	-0.3	-0.4	-0.2	-0.2
Trade	60	60	1.0	1.1	0.8	0.9
FIRE	-10	-10	-1.1	-1.2	-0.7	-0.8
Services	-30	-30	-1.2	-1.2	-0.7	-0.7
Government	0	0	-0.2	-0.2	-0.1	-0.1
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	20	10	-1.4	-1.6	-0.6	-0.7
Tulare Lake						
Agric., Frst., Fish.	0	0	0.0	0.0	0.0	0.0
Mining	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0.0	0.0	0.0	0.0
Manufacturing	0	-10	-0.5	-0.7	-0.2	-0.7
TCU	0	0	0.0	-0.1	0.0	-0.1
Trade	-20	-30	-0.5	-0.7	-0.4	-0.7
FIRE	0	0	0.0	-0.2	0.0	-0.2
Services	0	-10	0.0	-0.3	0.0	-0.3
Government	0	0	0.0	0.0	0.0	0.0
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	-30	-40	-1.1	-2.1	-0.6	-2.1
Bay Area						
Agric., Frst., Fish.	0	0	0.0	-0.1	0.0	0.0
Mining	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0.0	-0.1	0.0	-0.1
Manufacturing	-10	-10	-1.2	-1.9	-0.4	-0.7
TCU	0	-10	-0.3	-0.8	-0.2	-0.4
Trade	-20	-40	-0.8	-1.6	-0.5	-1.0
FIRE	-10	-10	-1.0	-2.2	-0.6	-1.5
Services	-20	-50	-1.1	-2.6	-0.7	-1.6
Government	0	0	-0.2	-0.3	-0.1	-0.1
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	-60	-130	-4.5	-9.6	-2.5	-5.5
California Total						
Agric., Frst., Fish.	-10	-10	-0.4	-0.7	-0.2	-0.3
Mining	0	0	-0.1	-0.1	0.0	0.0
Construction	0	0	0.0	-0.3	0.0	-0.2
Manufacturing	-10	-10	-1.7	-2.7	-0.5	-1.2
TCU	-10	-10	-0.8	-1.8	-0.4	-1.0
Trade	20	-20	-0.5	-1.9	-0.1	-1.2
FIRE	-20	-40	-2.9	-5.5	-1.8	-3.6
Services	-70	-130	-3.2	-5.9	-1.9	-3.8
Government	0	-10	-0.6	-1.0	-0.3	-0.5
Misc	0	0	-0.1	-0.1	-0.1	-0.1
TOTAL/1	-100	-250	-10.3	-20.1	-5.3	-12.0

Note:(1) May differ from sum of elements due to rounding

TABLE 26

REGIONAL ECONOMIC IMPACTS ON ALL SECTORS: AVERAGE YEAR FOLLOWING DRY 5-YEAR BASE CONDITION COMPARED TO THE PREFERRED ALTERNATIVE AVERAGE YEAR CONDITION

	Impacts on all Sectors					
	Employment (# of jobs)		Output ($MM)		PoW Income ($MM)	
Region Directly Impacted	Direct	Total	Direct	Total	Direct	Total
Sacramento River						
Agriculture						
Reduced Output	-700	-2240	-92.1	-194.5	-30.8	-86.9
Reduced Net Income	130	240	4.7	12.4	2.6	6.9
Total Agriculture	-570	-2000	-87.4	-182.1	-28.2	-80.0
M&I Water Costs	-60	-140	0.4	-0.9	-0.2	-0.5
TOTAL 1/	**-630**	**-2140**	**-91.8**	**-191.6**	**-30.5**	**-85.2**
San Joaquin River						
Agriculture						
Reduced Output	-10	-20	-0.7	-1.5	-0.3	-0.7
Reduced Net Income	-140	-240	-5.4	-11.7	-3.0	-6.5
Total Agriculture	-150	-270	-6.1	-13.2	-3.3	-7.3
M&I Water Costs	-80	-150	0.0	0.0	0.0	0.0
TOTAL 1/	**-230**	**-420**	**-11.0**	**-22.7**	**-5.9**	**-12.4**
Tulare Lake						
Agriculture						
Reduced Output	0	-10	-0.2	-0.5	-0.1	-0.2
Reduced Net Income	-100	-170	-3.6	-7.1	-1.9	-3.8
Total Agriculture	-100	-170	-3.8	-7.6	-2.0	-4.0
M&I Water Costs	0	0	0.0	0.0	0.0	0.0
TOTAL 1/	**-100**	**-170**	**-4.4**	**-8.8**	**-2.3**	**-4.6**
Bay Area						
Agriculture						
Reduced Output	0	0	0.0	0.0	0.0	0.0
Reduced Net Income	-10	-20	-0.6	-1.4	-0.3	-0.8
Total Agriculture	-10	-20	-0.6	-1.4	-0.3	-0.8
M&I Water Costs	-60	-130	-0.5	-1.1	-0.3	-0.6
TOTAL 1/	**-70**	**-150**	**-5.0**	**-10.8**	**-2.8**	**-6.2**
California Total						
Agriculture						
Reduced Output	-710	-2270	-93.0	-196.5	-31.2	-87.9
Reduced Net Income	-120	-190	-4.8	-7.8	-2.6	-4.1
Total Agriculture	-830	-2460	-97.8	-204.3	-33.8	-92.0
M&I Water Costs	-200	-420	-0.1	-1.9	-0.5	-1.1
TOTAL 1/	**-1030**	**-2880**	**-112.2**	**-233.8**	**-41.4**	**-108.3**

Note: (1) May differ from sum of elements due to rounding.

TABLE 27

REGIONAL ECONOMIC IMPACT: AVERAGE YEAR FOLLOWING DRY 5-YEAR BASE CONDITION COMPARED TO THE PREFERRED ALTERNATIVE AVERAGE YEAR CONDITION

	Employment (# of jobs)		Output ($MM)		PoW Income ($MM)	
Region and Affected Sector	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Sacramento River						
Agric., Frst., Fish.	-450	-630	-26.1	-33.0	-13.4	-16.6
Mining	0	0	0.0	-0.1	0.0	0.0
Construction	0	-30	0.0	-2.1	0.0	-1.2
Manufacturing	-230	-290	-64.9	-73.1	-16.9	-19.8
TCU	0	-120	-0.2	-16.8	-0.1	-7.5
Trade	90	-310	1.6	-13.8	1.2	-8.1
FIRE	-10	-200	-0.9	-22.7	-0.5	-14.6
Services	-20	-500	-1.0	-22.8	-0.6	-13.8
Government	0	-50	-0.2	-7.2	-0.1	-3.5
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	-630	-2130	-91.8	-191.6	-30.5	-85.2
San Joaquin River						
Agric., Frst., Fish.	-10	-20	-0.8	-1.2	-0.4	-0.5
Mining	0	0	-0.1	-0.1	0.0	0.0
Construction	0	0	0.0	-0.3	0.0	-0.1
Manufacturing	-30	-40	-3.8	-5.1	-1.4	-1.9
TCU	0	-10	-0.3	-1.2	-0.2	-0.6
Trade	-140	-210	-3.6	-5.8	-2.4	-3.7
FIRE	-10	-30	-1.1	-4.2	-0.7	-2.7
Services	-30	-100	-1.2	-4.3	-0.7	-2.6
Government	0	-10	-0.2	-0.5	-0.1	-0.2
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	-230	-420	-11.0	-22.7	-5.9	-12.4
Tulare Lake						
Agric., Frst., Fish.	0	-10	-0.3	-0.4	-0.1	-0.4
Mining	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0.0	-0.1	0.0	-0.1
Manufacturing	-20	-20	-2.1	-2.7	-0.7	-2.7
TCU	0	0	0.0	-0.4	0.0	-0.4
Trade	-80	-110	-2.1	-2.9	-1.5	-2.9
FIRE	0	-10	0.0	-0.9	0.0	-0.9
Services	0	-30	0.0	-1.2	0.0	-1.2
Government	0	0	0.0	-0.2	0.0	-0.2
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	-100	-170	-4.4	-8.8	-2.3	-8.8
Bay Area						
Agric., Frst., Fish.	0	0	0.0	-0.1	0.0	0.0
Mining	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0.0	-0.1	0.0	-0.1
Manufacturing	-10	-10	-1.4	-2.2	-0.5	-0.8
TCU	0	-10	-0.3	-0.8	-0.2	-0.4
Trade	-30	-50	-1.1	-2.0	-0.7	-1.3
FIRE	-10	-20	-1.0	-2.4	-0.6	-1.6
Services	-20	-60	-1.1	-2.8	-0.7	-1.8
Government	0	0	-0.2	-0.3	-0.1	-0.2
Misc	0	0	0.0	0.0	0.0	0.0
TOTAL/1	-70	-150	-5.0	-10.8	-2.8	-6.2
California Total						
Agric., Frst., Fish.	-470	-660	-27.2	-34.6	-13.9	-17.5
Mining	0	0	-0.1	-0.2	0.0	-0.1
Construction	0	-40	0.0	-2.6	0.0	-1.5
Manufacturing	-290	-370	-72.2	-83.1	-19.6	-25.2
TCU	-10	-140	-0.8	-19.3	-0.4	-8.9
Trade	-170	-680	-5.0	-24.5	-3.3	-16.0
FIRE	-20	-260	-2.9	-30.2	-1.8	-19.8
Services	-70	-680	-3.3	-31.1	-2.0	-19.3
Government	0	-60	-0.6	-8.2	-0.3	-4.1
Misc	0	0	-0.1	-0.1	-0.1	-0.1
TOTAL/1	-1030	-2880	-112.2	-233.8	-41.4	-112.5

Note:(1) May differ from sum of elements due to rounding.

SECTION 3
MUNICIPAL AND INDUSTRIAL WATER USE ECONOMICS

MUNICIPAL AND INDUSTRIAL ECONOMICS

The municipal and industrial economics analysis is based upon the Average-Average tiered pricing scenario. This analysis is based upon the impacts to CVP contractors. This is different than the municipal and industrial economic analysis that was included in the PEIS.

The PEIS municipal and industrial water cost analysis primarily evaluated the impacts on the need and cost to transfer water to non-CVP municipalities. Therefore, the analysis included water costs for many non-CVP water users. For example, the municipality in the San Joaquin River Basin was based upon the Cities of Stockton and Fresno water costs which are not based on CVP water, as described in the Municipal Water Costs Methodology and Modeling Technical Appendix to the PEIS.

The analysis included in the following table is based only on CVP contractors in order to define the cost of CVP water under the Tiered Water Pricing proposal.

TABLE 28

SUMMARY OF M&I ECONOMICS ANALYSIS FOR AVERAGE YEAR CONDITIONS FOR REGIONAL ECONOMICS

Result	Preferred Alternative Average	Change from the Preferred Alternative Average		
		Average-Average	Dry-Average	Wet-Average
Average Condition				
Supplies, 1,000 acre-feet (1)				
Sacramento Valley	929.0	0.0	0.0	0.0
Bay Area	1024.0	0.0	0.0	0.0
San Joaquin Valley	704.0	0.0	0.0	0.0
Central and South Coast	5921.0	0.0	0.0	0.0
Average Condition				
Economic Costs, Million $ (2)				
Sacramento Valley	1.1	4.1	4.3	4.1
Bay Area	3.5	4.6	4.6	4.6
San Joaquin Valley	0.3	5.2	5.2	5.2
Central and South Coast	649.0	0.0	0.0	0.0

NOTES:

Water transfers not considered as replacement supplies in this comparison.

(1) After purchase or development of non-transfer replacement supplies to make supply equal demand.

(2) Total costs include replacement supplies, restoration payments and metering. A negative cost means a net gain is estimated.